

San Francisco Law Library

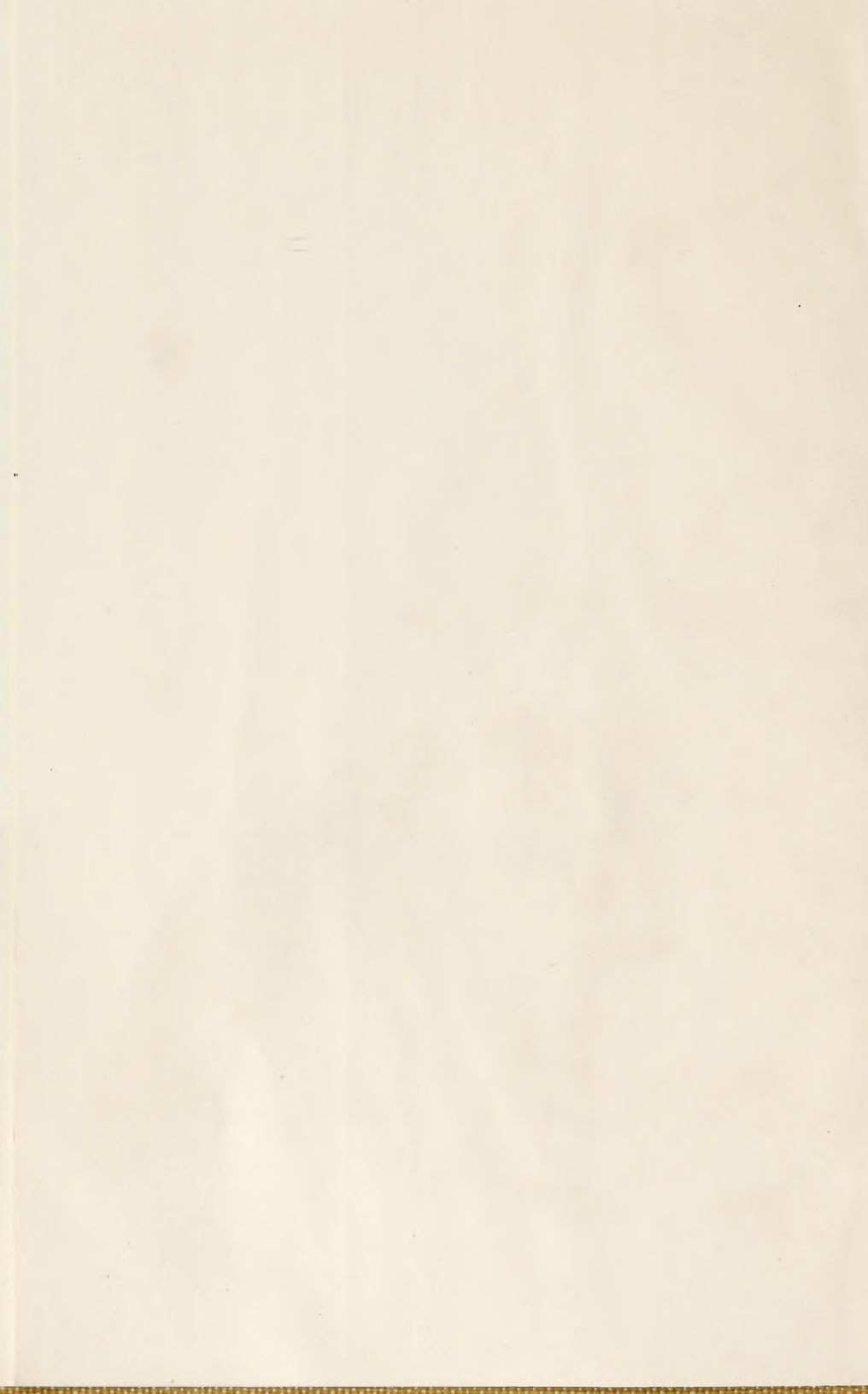
No. 76653

Presented by

EXTRACT FROM BY-LAWS

Section 9. No book shall, at any time, be taken from the Library Room to any other place than to some court room of a Court of Record, State or Federal, in the City of San Francisco, or to the Chambers of a Judge of such Court of Record, and then only upon the accountable receipt of some person entitled to the use of the Library. Every such book so taken from the Library, shall be returned on the same day, and in default of such return the party taking the same shall be suspended from all use and privileges of the Library until the return of the book or full compensation is made therefor to the satisfaction of the Trustees.

Sec. 11. No books shall have the leaves folded down, or be marked, dog-eared, or otherwise soiled, defaced or injured. Any party violating this provision, shall be liable to pay a sum not exceeding the value of the book, or to replace the volume by a new one, at the discretion of the Trustees or Executive Committee, and shall be liable to be suspended from all use of the Library till any order of the Trustees or Executive Committee in the premises shall be fully complied with to the satisfaction of such Trustees or Executive Committee.




1103

2996

1103

1



Digitized by the Internet Archive
in 2010 with funding from
Public.Resource.Org and Law.Gov

United States
Circuit Court of Appeals
For the Ninth Circuit.

WILSON & WILLARD MANUFACTURING
COMPANY, a Corporation,

Appellant,

vs.

UNION TOOL COMPANY, a Corporation, ED-
WARD DOUBLE, ROSA EICHENHOFER,
as Administratrix of the Estate of FRIED-
RICH EICHENHOFER, Deceased, and
GEORGE L. CHADDERDON,

Appellees.

BOOK OF EXHIBITS.

Upon Appeal from the United States District Court
for the Southern District of California,
Southern Division.

INDEX TO THE PRINTED TRANSCRIPT OF RECORD.

[Clerk's Note: When deemed likely to be of an important nature, errors or doubtful matters appearing in the original certified record are printed literally in italic; and, likewise, cancelled matter appearing in the original certified record is printed and cancelled herein accordingly. When possible, an omission from the text is indicated by printing in italic the two words between which the omission seems to occur.]

	Page
Designation Under Rule 23	297
EXHIBITS:	
Complainants' Exhibit A. Willard U. S. Patent 762,458	20
Complainants' Exhibit Blakeslee, Letter of February 3, 1913	25
Complainants' Exhibit Blue-Print of Oil Well Supply Co. Canadian Under- Reamer, 1902	97
Complainants' Exhibit Cummings Patent..	90
Complainants' Exhibit Double Patent— No. 734,833	1
Complainants' Exhibit Double Patent 796,197	7
Complainants' Exhibit Double Patent No. 862,317	28
Complainants' Exhibit Jones or Improved North Patent	14
Complainants' Exhibit Wilson File Wrap- per and Contents	34
Defendant's Exhibit Certified Copy of File Wrapper and Contents of O'Donnell & Willard U. S. Patent No. 762,435.....	112

	Index.	Page
EXHIBITS—Continued:		
Defendant's Exhibit Certified Digest of Patent Office Records—Re Brown Patent		287
Defendant's Exhibit Certified File Wrap- per and Contents Double Patent in Suit		227
Defendant's Exhibit Hobart & Ahearn U. S. Patent No. 439,275		199
Defendant's Exhibit Letter J. O. Dart to Edward North of March 15, 1902.....		273
Defendant's Exhibit Letter of March 19, 1902, Martin Barber to Edward North.		274
Defendant's Exhibit O'Donnell & Willard Patent		98
Defendant's Exhibit Page 80, Oil Well Sup- ply Co.'s Catalog of 1900.....		269
Defendant's Exhibit Page 82, Oil Well Sup- ply Co.'s Catalog of 1900		270
Defendant's Exhibit Page 117, Oil Well Supply Co.'s Catalog of 1900.....		271
Defendant's Exhibit Photograph of Califor- nia Oil Well Rig Showing Calf-wheel, Bull-wheel, Wire Rope and Top of Casing in Hole, the Casing Shown Be- ing Heavy Casing Weighing not Less Than 54 Pounds to the Foot		275
Defendant's Exhibit Specifications of U. S. Brown's 687,296		283
Defendant's Exhibit Swan Patent 683,352..		105
Defendant's Exhibit Union Oil Tool Com- pany's Circular of North Improved Underreamer		226

Index.

Page

EXHIBITS—Continued:

Defendant's Exhibit U. S. Allen Patent No. 294,302	213
Defendant's Exhibit U. S. Carruthers Patent No. 479,933	217
Defendant's Exhibit U. S. Day Patent 403,877	152
Defendant's Exhibit U. S. Deisch Patent No. 526,440	204
Defendant's Exhibit U. S. Duncan Patent No. 662,895	222
Defendant's Exhibit U. S. Kellerman Pat- ent No. 679,384	167
Defendant's Exhibit U. S. Lloyd Patent No. 344,744	194
Defendant's Exhibit U. S. Mack Patent No. 492,371	156
Defendant's Exhibit U. S. North Patent No. 674,793	162
Defendant's Exhibit U. S. Mentry Patent No. 647,605	186
Defendant's Exhibit U. S. Patent to Mack No. 496,317	176
Defendant's Exhibit U. S. Patent to Palm No. 563,054	181
Defendant's Exhibit U. S. Plotts Patent No. 668,340	265
Defendant's Exhibit U. S. Sullivan Patent No. 79,276	190

EXHIBITS—Continued:

Defendant's Exhibit U. S. Yorke Patent	
No. 475,913	208
Defendant's Exhibit Wilson Underreamer	
Patent	277

Complainants' Exhibit Double Patent.

[Endorsed]: U. S. District Court, Southern District of California, Southern Division. Union Tool Co. et al., Compls., vs. Wilson & Willard Mfg. Co. Exhibit Complainants' Exhibit Double Patent. Filed Nov. 1, 1912. Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Complainants' Exhibit Double Patent. Filed May 8, 1917. F. D. Monckton, Clerk.

No. 734.833.

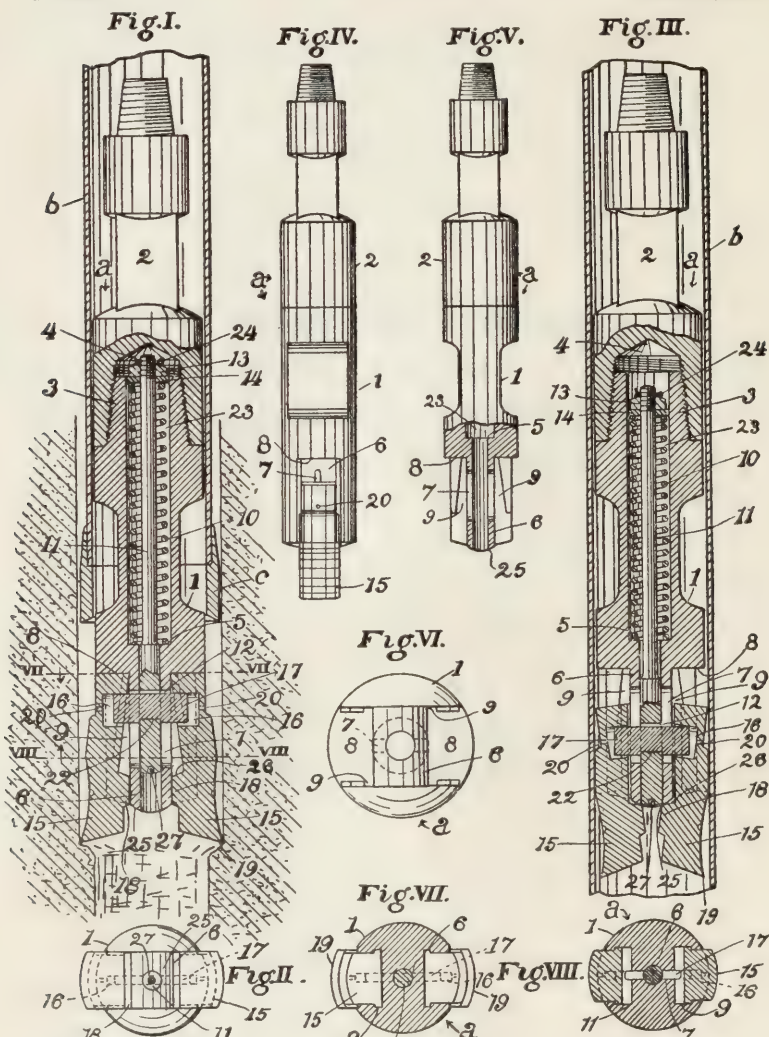
PATENTED JULY 28, 1903.

E. DOUBLE.
UNDERREAMER.

APPLICATION FILED OCT. 26, 1901.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses. ²
C. F. Richey.
J. Townsend.

9 11
Inventor.
Edward Double
by Townsend Bro.
his attys.

No. 734,833.

PATENTED JULY 28, 1903.

E. DOUBLE.
UNDERREAMER.

APPLICATION FILED OCT. 26, 1901.

NO MODEL.

3 SHEETS-SHEET 2

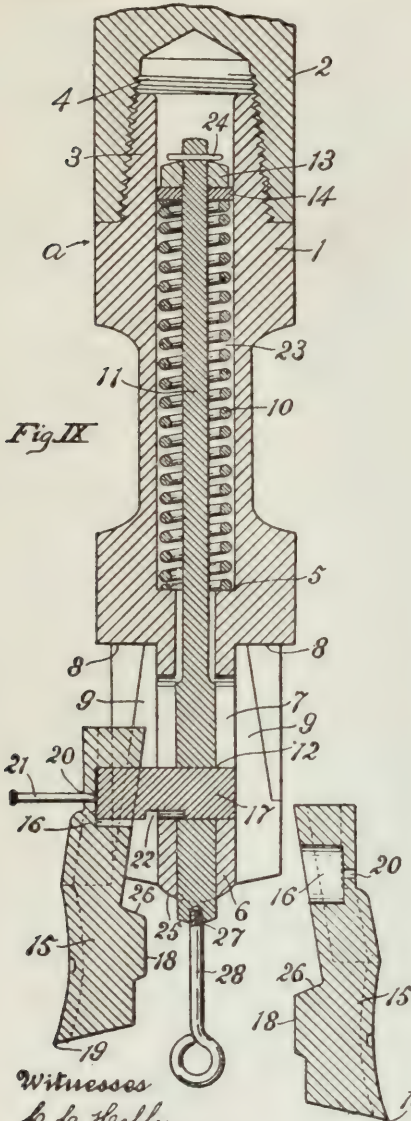


Fig IX

Fig X

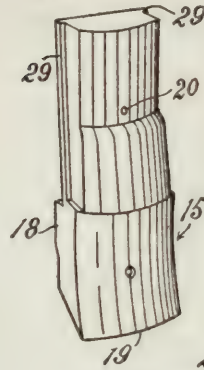


Fig XI

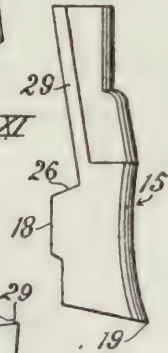
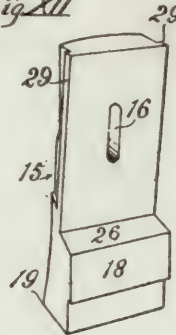


Fig XII



Witnesses
C. C. Holly
J. Townsend.

Inventor
Edward Double
by Townsend Bro
his atty.

UNITED STATES PATENT OFFICE.

EDWARD DOUBLE, OF SANTA PAULA, CALIFORNIA.
UNDERREAMER.

SPECIFICATION forming part of Letters Patent No. 734,833, dated July 28, 1903.

Application filed October 26, 1901. Serial No. 80,144. (No model.)

To all whom it may concern:

Be it known that I, EDWARD DOUBLE, a citizen of the United States, residing at Santa Paula, in the county of Ventura and State of California, have invented a new and useful Underreamer, of which the following is a specification.

An object of this invention is to provide an underreamer which is easily constructed, effective in action, and will not be liable to any breakage or loss of parts while in operation.

My invention includes the novel underreamer and the combinations and parts hereinafter described and claimed and is capable of being carried out in various ways.

The accompanying drawings illustrate my invention.

Figure I is a view partly in vertical mid-section of an underreamer in operation below a well-casing, a portion of which is shown. Fig. II is a plan of the lower end of the underreamer with the slips in the position shown in Fig. I. Fig. III is a view of an underreamer with parts in position for passing through the casing. Portions are shown in vertical mid-section. A fragment of the casing is shown in axial section. Fig. IV is an elevation of the underreamer intact viewed from the right of Fig. III. Fig. V is an elevation of the underreamer-mandrel viewed from the right of Fig. IV, portions being broken away to expose the inner construction of the lower part of the mandrel. Fig. VI is an enlarged plan of the lower end of the underreamer-mandrel inverted. Figs. VII and VIII are sections on lines indicated by VII and VIII, respectively, in Fig. I, looking in the directions of the arrows, respectively. Fig. IX is an enlarged mid-sectional detail to illustrate the manner of applying or taking off the slips. Figs. X, XI, and XII illustrate one of the slips from different points of view.

a designates a hollow mandrel desirably constructed of a hollow body 1 and a joint member 2 screwed thereon, the hollow body 1 being furnished at its upper end with a screw-threaded pin 3 to screw into the socket 4 in the lower end of the joint member 2. The hollow mandrel is furnished with an internal shoulder 5, a downward extension 6, with oppositely-arranged parallel bearing-faces having a keyway 7 therein, shoulders 8 at the

sides of such extension, and upwardly and inwardly sloping tapering dovetail slipways 9 beneath said shoulders.

10 designates a spring on the shoulder 5 in the hollow mandrel.

11 designates a rod playing up and down in the mandrel and furnished with a keyseat 12 and supported by the spring 10. Preferably the rod 11 is furnished with a nut 13, screwed on its upper end, to be upheld by the spring 10.

14 designates a washer between the nut and the spring.

15 designates tilt-slips slidingly connected with the mandrel and playing in the slipways 9 and furnished with key-seats 16, respectively.

17 designates a key in the key-seats of the slips and rod and playing in the keyway 7 of said extension and upheld by the spring-supported rod 11 to hold the slips against the shoulders 8.

The sockets or key-seats 16 are somewhat larger than the key 17 to permit the slips 15 to partake of a tilting action, the key 17 thus forming a portion on the rod 11, on which the tilt slips or bits 15 are loosely swung or pivoted, adapting their lower ends to tilt or swing in toward the center of the stock or mandrel portion to pass through the well-casing or to tilt away from the center to assume the proper position for reaming. The tilt-slips are provided with shoulders 18, adapted to slide upon a spreading portion provided in connection with the mandrel-body. Said slips are furnished with inward projections 18 to slide upon the downward extension 6 of the mandrel to spread apart the cutting edges 19 of the slips when the slips are drawn up. The slips 15 are slidingly mounted on opposite sides of the downwardly-extending portion of the mandrel, and the key-seats 16 thereof are on the inner faces of the slips, respectively, and are practically closed at their outer ends, thus to exclude any mud or other foreign materials when the underreamer is in operation.

20 designates small holes in the slips, respectively, to allow a punch 21 to be inserted for adjusting the key in the operation of applying or taking off the slips. The key is preferably a notched key, being provided in

its lower edge with a notch 22, so that when the key is in place in its seat 12 the walls of the notch will engage the rod 11, thus to guard against displacement of the key from the position shown in Figs. I and III. The spring 10 affords yielding means for constantly holding the rod 11 up in the notch 22 and to hold the slips 15 against the shoulders 8, the parts of the underreamer being constructed to allow the key to be inserted through the rod 11 into the key-seat of a slip only when the slips and rod are drawn down with the key-seat 12 of the rod flush with the bottom of the keyway 7 in the mandrel. For this purpose the tapering dovetail slipways 9 open laterally just above the plane of the lower end of the bottom of the keyway 7 in the extension to allow the key 17 to be inserted in the key-seats 12 and 20 only when said seats are flush with the lower end of the keyway 7 and the slip drawn out as far sideways as it can be drawn, as shown in Fig. IX.

To assemble the parts of the underreamer in the first instance, the hollow body 1 being unscrewed from the joint member 2, the spring 10 will be inserted into the chamber 23 of the mandrel to rest on the shoulder 5 therein, and the slip-carrying rod 11 will be inserted into place and the washer 14 and nut 13 adjusted, as shown in Fig. I. The nut is preferably held from unscrewing by means of a cotter-pin 24 passed through the rod 11 after the nut has been screwed home. The rod is then forced or pulled downward by any suitable means into the position shown in Fig. IX, thus bringing the bottom of the key-seat 12 flush with the bottom of the slot 7 in the extension 6 of the mandrel. Then one of the slips is applied in position, with its key-seat 16 ready to receive the key 17, when the same is inserted through the key-seat 12 and the slot 7. Then the key is inserted and is passed through the key-seat of the rod sufficiently far to allow the other slip to be brought into position, so that the key may be pushed back into the key-seat of said other slip. Then a suitable instrument, such as the punch 21, will be inserted through the hole 20 and the key will be pushed back into the key-seat of the slip last applied, whereupon the notch 22 will be brought into position to receive the lower wall of the key-seat 12. Then the rod 11 is released, thus allowing the yielding means 10 to draw the rod up into the mandrel, thus bringing the slips 15 up against the shoulders 8 and the inward projections 18 against the sides of the downward extension 6, thereby spreading apart the lower ends of the slips.

The face 25 of the lower end of the downward extension 6 of the mandrel is upwardly sloping at its edges and the upper faces 26 of the extensions are downwardly sloping, so that when the slips are drawn upward they are readily forced outward by the sliding contact of the sloping faces 25 and 26.

By the construction shown wherein the hollow mandrel is provided at its upper end with

a pin screwed into the lower end of the joint member 2 great strength of the hollow mandrel is insured.

In Fig. I, *b* designates the well-casing and *c* the usual shoe at the bottom of such casing.

In order to conveniently remove and reapply the slips for the purpose of sharpening or for any other purpose, the lower end of the rod 11 is furnished with a screw-threaded socket 27, and means for drawing down the rod against the pressure of the spring 10 are temporarily screwed into the socket to enable the operator to bring the rod 11 into position to allow the slips to be removed and replaced without unscrewing the body of the mandrel from the joint member.

The eyebolt 28 (shown in Fig. IX) indicates a form of such means.

To remove the slips, the rod will be drawn down into the position shown in Fig. IX, thus bringing the key against the lower end of the keyway 7 in the extension 6 and allowing the rod to be drawn out of engagement with the notched edge of the key 17, whereupon a suitable instrument, such as the punch 21, will be inserted into the hole 20 and the key driven into the position substantially shown in Fig. IX, thus releasing one of the slips, whereupon the punch 21 will be inserted into the hole 20 in the other slip and the key will be driven out of the key-seat 16 in said other slip, thereby releasing the other slip.

To replace the slips, the operation just described will be reversed.

When the slips have been replaced, the rod will be released and the eyebolt unscrewed and the apparatus is ready for use.

29 designates the dovetail flanges of the slips to play in the ways 9.

To introduce the underreamer into the well-casing, the slips will be tilted and drawn down into the position shown in Fig. III, thus bringing the projections 18 below the extension 6, whereupon the edges 19 are brought toward each other sufficiently to allow the tool to pass down through the casing, and when the slips escape below the shoe *c* the spring 10 draws up the rod 11, which tilts the slips into cutting position, as indicated in Fig. I. When the tool is drawn upward, the slips coming into contact with the shoe will be tilted and pressed into the position shown in Fig. III and will readily pass out through the casing.

The rounded end 25 of the extension 6 when pressed against the abrupt projections 18 causes a quick tilting of the slips to throw their cutting edges outwardly, and the slips are thus brought into position with a comparatively slight longitudinal movement.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. An underreamer comprising a hollow mandrel furnished with an internal shoulder, a downward extension having opposite parallel bearing-faces having a keyway therein, shoulders at the sides of such extension, and upwardly and inwardly sloping dovetail slip-

ways beneath said shoulders; a spring on the shoulder in the hollow mandrel; a rod playing in the mandrel furnished with a key-seat and supported by the spring; dovetail tilt-slips playing in the slipways and furnished with key-seats respectively; a key in the key-seats of the slips and rod and playing in the keyway of said extension to hold the slips against the shoulders; said slips being furnished with inward projections to slide upon the downward extension of the mandrel to spread apart the cutting edges of the slips when the slips are drawn up.

2. An underreamer furnished with a mandrel having a downward extension provided with opposite parallel bearing-faces and a keyway in the extension; a spring-supported rod furnished with a key-seat and playing up and down in the mandrel; tilt-slips slidingly connected with the mandrel and furnished with inward projections to slide upon the opposite bearing-faces of the downward extension to spread the slips apart at the lower ends when the slips are drawn up; and a key carried by the rod and carrying the slips.

3. In an underreamer, the combination of a mandrel; slips slidingly mounted on opposite sides of a portion of said mandrel and furnished on their inner faces respectively with key-seats, said key-seats being somewhat larger than the key on the operating-rod; a yieldingly-supported rod playing lengthwise of the mandrel and furnished with a key-seat; and a notched key in the key-seats of the rod and slips, a portion of said rod taking into the notch of said key.

4. A mandrel furnished with shoulders and a slotted extension beyond said shoulders and with dovetail ways on opposite sides of said extension; dovetail tilt-slips for said ways furnished on their inner faces respectively with key-seats; a rod sliding in said mandrel and furnished with a key-seat; a notched key in the key-seats of the slips and rod; a portion of said rod taking into the notch of said key, and yielding means to draw the rod up; the parts being constructed to allow the key to be inserted through the rod into the key-seat of a slip only when the slip and rod are drawn down with the key-seats thereof flush with the bottom of the keyway in the mandrel.

5. In an underreamer, dovetail tilt-slips furnished with key-seats respectively on their inner faces; a rod furnished with a key-seat; a key for said key-seats; a mandrel in which the rod plays constructed with a slotted extension and tapering dovetail slipways which open laterally just above the lower end of the bottom of the slot in the extension, to allow the key to be inserted in the slot and key-seats only when the key-seats are flush with the lower end of the slot.

6. In an underreamer, a mandrel furnished with a hollow slotted extension, the lower end of which slopes upward at the edges; tilt-slips slidingly connected with the mandrel and furnished on their inner faces with projections, the upper faces of which slope downward to slide upon the extension of the mandrel; and means connecting the slips with the rod.

7. In an underreamer, the combination with a hollow mandrel, provided with a slotted extension, a spring-actuated slip-operating rod provided with a pivot-key, tilt-slips provided with key-seats adapted to be engaged by said pivot-key, said key-seats being somewhat larger than the key to allow the slips to tilt, said slips provided with inwardly-projecting shoulders, and said slotted extension provided with surfaces adapted to tilt said slips and hold the same in expanded position.

8. In an underreamer the combination of a hollow mandrel with a hollow slotted extension, said extension having opposite parallel bearing-faces, a slip-carrying rod in said mandrel, slips connected to said rod, said slips having projections which bear against said extension, said slips being provided with key-seats, a key carried by said rod, each end of the key lying in a key-seat of a slip, and the key-seat in each slip being somewhat larger than the key to allow the slips to partake of a tilting action.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, at Santa Paula, in the county of Ventura and State of California, this 19th day of October, 1901.

EDWARD DOUBLE,

Witnesses:

WALTER WEEKLEY,
W. F. DINGER.

Complainants' Exhibit Double Patent 796,197.

[Endorsed]: U. S. Dist. Court, So. Dist. of Cal.,
So. Div. #1540—In Equity. Union Tool Co. et al.
vs. Wilson & Willard Mfg. Co. "Complainants' Ex-
hibit Double Patent 796,197." Leo Longley, Special
Examiner. Filed Apr. 16, 1913. Wm. M. Van
Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

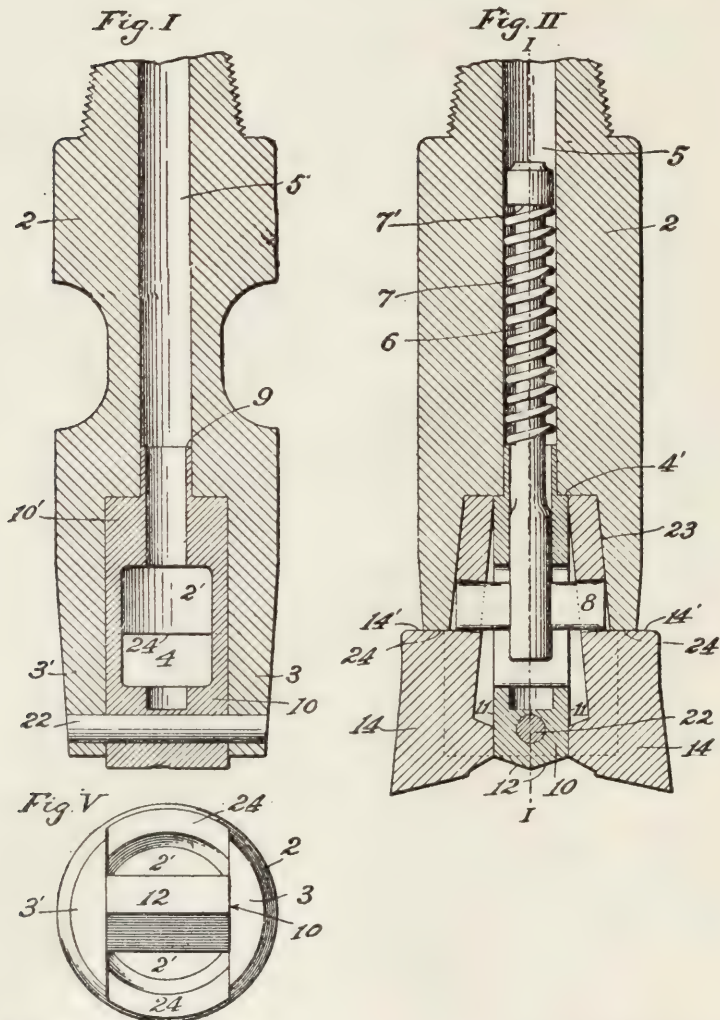
No. 2996. U. S. Circuit Court of Appeals for the
Ninth Circuit. Complainants' Exhibit Double Pat-
ent 796,197. Filed May 8, 1917. F. D. Monckton,
Clerk.

No. 796,197.

PATENTED AUG. 1, 1905.

E. DOUBLE.
UNDERREAMER.
APPLICATION FILED DEC. 18, 1903.

3 SHEETS—SHEET 1.



Witnesses
C. C. Kelly
Frederick J. Ryan

Inventor
Edward Double
J. Townsend Bros.
his attys

No. 796,197

PATENTED AUG. 1, 1905.

E. DOUBLE.
UNDERREAMER.

APPLICATION FILED DEC. 18, 1902.

2 SHEETS—SHEET 2

Fig III

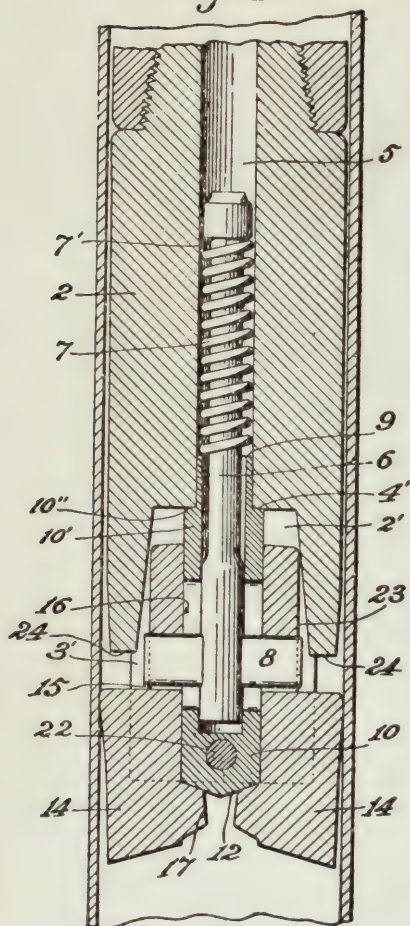


Fig IV

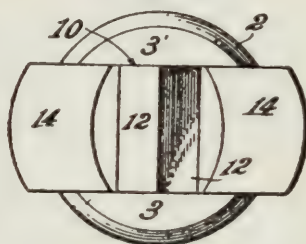
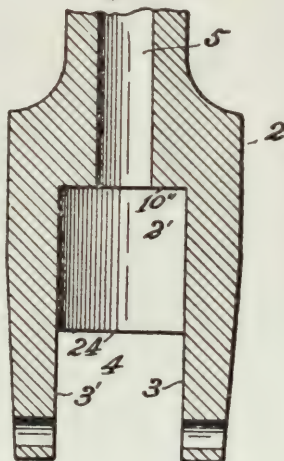


Fig VI



Witnesses

C. B. Holly
Frederick Lyon

Inventor
Edward Double

by Townsend & Co.
his attys

UNITED STATES PATENT OFFICE.**EDWARD DOUBLE, OF LOS ANGELES, CALIFORNIA.****UNDERREAMER.****No. 796,197.****Specification of Letters Patent.****Patented Aug. 1, 1905.****Application filed December 18, 1902. Serial No. 135,792.***To all whom it may concern:*

Be it known that I, EDWARD DOUBLE, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Underreamers, of which the following is a specification.

This invention relates to means for reaming out or increasing the bore of oil or Artesian well holes, and particularly to a device adapted to be passed through the well-casing and ream out or enlarge the bore of the well below the casing, so that the casing may be readily lowered.

The object of the invention is to provide a device of this class which shall be extremely simple and cheap in construction and positive and efficient in operation.

The invention consists generally in an underreamer comprising in combination a mandrel or body portion, said portion provided with a slotted extension having open sides and with a central bore, a removable cap or end block forming a central bar or bridge extending across the center of said slotted portion, said bar or bridge provided with lower faces downwardly and inwardly converging and forming a spreading portion, an automatic spring-actuated slip-operating rod slidably mounted in said center bore of the mandrel and provided with a key or head, and reaming-bits adapted to extend into the slotted extension through the open sides thereof and provided with key-seats into which the ends of said keys or head are adapted to engage, said key-seats being somewhat larger than the ends of the key or head to permit the bits or slips to tilt or swing thereon and said bits provided with shoulders or portions adapted to extend inwardly to contact with the converging face of said bar or bridge.

The invention consists, further, in a mandrel having a center bore, a central socket or chamber, and an open-ended open-sided hollow extension through which portions of the bits extend up into said central socket or chamber and bear against the inner walls thereof; further, in utilizing the wall portions forming the upper ends of said side slot as abutting surfaces against which shoulders on the bits are adapted to bear.

The invention consists, further, in the constructions and combinations of parts herein-after described, and particularly pointed out in the claims and will be more readily understood by reference to the accompanying draw-

ings, forming part of this specification, in which—

Figure I is a longitudinal sectional view of an underreamer embodying my invention, taken on line II of Fig. II, the reaming-bits having been removed, the end block or bridge being shown in place. Fig. II is a longitudinal sectional view thereof as the same appears when ready for underreaming. Fig. III is a similar view as the same appears as the tool passes through the casing. Fig. IV is an under side view showing the bits in the position of Fig. II. Fig. V is an under side view, the bits having been removed. Fig. VI is a partial longitudinal sectional view similar to Fig. I, showing the end block or bridge removed.

As shown in the drawings, 2 represents the mandrel or body portion, which is provided with a central socket or chamber 2' and with a slotted extension having the walls 3 3' and open-sided slot 4. The body portion 2 is also provided with the central bore 5, in which the slip operating and carrying rod 6 is adapted to slide. This rod is encircled by a coiled spring 7, one end of which bears against the shoulder or spring-seat 7' on the rod 6, the other end bearing against the upper end of the end block 10. It is thus seen that the rod 6 is normally held in a raised position. The rod 6 is provided with a key or head 8, either integral or detachable, as desired. The end of the slot 4 is closed by a cap or end block 10, forming a central bar or bridge, having parallel sides 11 and downwardly and inwardly converging or tapered faces 12 12'. As shown, this end block 10 is provided with an abutting shoulder 10". The portion 10 is cut away at its center in a long slot 14 thus forming an unobstructed open-sided chamber in which the key or head 8 and the bits play. This end block 10 is secured at the end of the walls 3 3' by a pin or key 22.

14 14 represent the reaming bits or tool bits. The bits are each provided with a key-seat or socket 15, an inner inclined face 16, and an inward projection, surface, or shoulder 17. The key-seats or socket 15 are somewhat larger than the ends of the key or head 8.

The operation is as follows: The device being in the position shown in Fig. III, a casing passing through the casing, as soon as the bit passes out the end of the casing the rod 6 is forced upward by the tension of the spring

and the reaming-bits drawn upward. The shoulders or portions 17 of the bits ride up the inclined faces of the spreading bar or end block 10, the key seats or sockets 15 permitting the bits to tilt on the key or head 8. The shoulders or surfaces 17 being brought up onto the straight sides of the bar or end block 10, the bits are held expanded. When it is desired to withdraw the underreamer from the well-hole, as the tool is raised the outer surfaces of the bits strike against the shoe of the well-casing, the rod 6 being thereby drawn down against the tension of the spring. As soon as the shoulders or surfaces 17 pass downward far enough on the sides 11 of the central bar or bridge 10 to reach the tapered surfaces 12 the bits will tilt until they are again in the position shown in Fig. III, when they pass freely through the casing.

I make the key seats or sockets 16 somewhat larger than the ends of the key or head 8, so that the lower ends of the bits or slips may tilt away from the bar or bridge 10 in expanding or tilt toward such bar or bridge when the shoulders or surfaces 17 pass downward far enough to slide inward on the converging spreading faces 12 of the bar 10.

It will be noted that the upper ends of the bits come within the socket or chamber 2', and when in position for reaming the outer faces 23 of the bits engage the inner surfaces of the chamber-walls, and the shoulders 14' of the bits or slips contact with the portions 24 of the mandrel. The portions 24 thus form abutting surfaces for the shoulders 14' of the reaming-bits. It will also be noted that the sides of the bits bear against the side walls of the slot 4, the walls forming guides preventing lateral play of the bits.

Having described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In an underreamer, in combination, a mandrel provided with a central bore and with an open-sided slotted extension, a removable end block or bridge adapted to be secured to the ends of said slotted extension, and having downwardly and inwardly converging faces and side bearing-surfaces, a spring-actuated slip operating rod slidably mounted in said central bore, the lower end of said rod provided with a key or head, and reaming-bits having key-seats somewhat larger than said key or head into which said key or head is adapted to extend, and said bits provided with tilting surfaces or shoulders adapted to contact with said converging faces on said central bar or bridge and to bear on said side bearing-surfaces when the bits are expanded.

2. In an underreamer, the combination, a mandrel provided with a central bore, and with an open-sided slotted extension, an end block or bridge portion and forming a central bar or bridge having spreading faces on its under side and bearing-surfaces on its sides, a spring-

actuated slip-operating rod slidably mounted in said central bore, and provided with a bit-engaging key or head, and reaming-bits provided with key-seats somewhat larger than said key or head into which said key or head is adapted to extend, said bits provided with tilting surfaces or shoulders adapted to move against said spreading faces and bear on said bearing-surfaces of said central bar when expanded and said bits provided with portions above said bearing-surfaces adapted to permit said bits to tilt inward when said rod is drawn down, so that said bits may tilt inward.

3. In an underreamer, in combination, a mandrel provided with a central bore and with an open-sided slotted extension, a removable end or bridge block secured on the ends of said slotted extension and forming a central bar or bridge having downwardly and inwardly converging faces and side bearing-surfaces, a spring-actuated rod slidably mounted in said central bore, the lower end of said rod provided with a key or head, and reaming-bits having key-seats somewhat larger than said key or head into which said key or head is adapted to extend, and said bits provided with tilting surfaces or shoulders adapted to contact with said converging faces on said central bar or bridge and to bear on said side bearing-surface when the bits are expanded, the width of said slips adapting the lateral faces thereof to bear against the side walls of said slotted extension thereby preventing lateral movement of the slips.

4. In an underreamer, the combination, a mandrel provided with a central bore, and with an open-sided slotted extension, a removable end block or bridge secured on said slotted extension, said end block or bridge having spreading faces on its under side and bearing-surfaces on its sides, a spring-actuated slip operating rod slidably mounted in said central bore, and provided with a bit-engaging key or head, and reaming-bits provided with key-seats somewhat larger than said key or head into which said key or head is adapted to extend, said bits provided with tilting surfaces or shoulders adapted to move against said spreading faces and bear on said bearing-surfaces of said central bar when expanded, and said bits provided with portions above said bearing-surfaces adapted to permit said bits to tilt inward when said rod is drawn down, the width of said slips adapting the lateral faces thereof to bear against the side walls of said slotted extension thereby preventing lateral movement of the slips.

5. In an underreamer, the combination with a slotted mandrel provided with a downwardly-projecting open-ended slotted or chambered extension, an end portion detachably secured thereon and provided with a central bar or bridge extending over the center of said slot and provided with spreading faces, a spring-actuated rod slidably arranged in

said slotted mandrel and having its lower end extending into the slot or chamber of said extension and provided with a key or head, and reaming-bits provided with key seats or sockets somewhat larger than the ends of said key into which said key extends, said bits provided with portions adapted to operate against said faces, and with surfaces to bear against the well-casing to tilt said bits inward and with side faces adapted to slide against the side walls of said slotted or chambered portion and prevent lateral play of the bits.

6. In an underreamer, in combination, a mandrel provided with a central bore, a chamber or socket and an open-sided slotted extension, an end block secured on said slotted extension, said end block provided with a central bar or bridge extending over the center of said slot and provided on its under side with spreading faces, a spring-actuated rod slidably arranged in said mandrel and provided with a bit-operating key or head, and reaming bits or slips provided with cutting edges and with key seats or sockets somewhat larger than the ends of said key or head, said bits provided with portions adapted to operate against said faces, and with surfaces to bear against the well-casing to tilt said bits inward.

7. In an underreamer, the combination, with a hollow mandrel, provided with a socket or chamber and with downwardly-extending walls having an open-sided slot therebetween, an end block on the ends of said walls and forming a bridge therebetween, said bridge portion provided with a wedge-shaped under surface, a spring-actuated bit supporting and operating rod slidably arranged in said hollow mandrel, and tilting bits freely, detachably and tiltingly supported on said rod and operated thereby, said bits provided with surfaces adapted to contact with said wedge-shaped under surface of said bridge, and with portions to contact with the interior of the casing when the tool is drawn up into the casing.

8. In an underreamer, the combination, of a mandrel, provided with a central bore in its upper portion and an open-ended socket or chamber in its lower portion, the lower portion of the walls of said chamber having open-ended parallel side slots, an end block keyed to the lower ends of said mandrel and forming a bridge across the ends of said slots, said block provided with spreading faces, a spring-actuated rod slidably arranged in said central bore, means on said rod for supporting and operating the bits, and bits having outer surfaces bearing against the interior of said socket or chamber, portions adapted to contact with the interior of the casing as the tool passes through the casing, and portions adapted to slide upon said spreading surfaces.

9. In an underreamer, the combination, of a mandrel provided with a central bore in its

upper portion and an open-ended socket or chamber in its lower portion, the lower portion of the walls of said chamber having open-ended parallel side slots, the walls of the upper ends of said slots forming abutting surfaces, an end block keyed to the lower ends of said mandrel and forming a bridge across the open ends of said slots, said block provided with spreading faces, a spring-actuated rod slidably arranged in said central bore, means on said rod for supporting and operating the bits, and bits having outer surfaces bearing against the interior of said socket or chamber, shoulders adapted to contact with said abutting surfaces when the bits are expanded, portions adapted to contact with the interior of the casing as the tool passes through the casing, and portions adapted to slide upon said spreading faces.

10. In an underreamer, the combination, of a mandrel, provided with a central bore, a central socket or chamber and an open-sided slotted hollow extension, having a bridge across its end, a spring-actuated slip-operating rod slidably mounted in said central bore and provided with a key or head and reaming-bits carried by said rod, portions of which bits extending up into said socket or chamber and bearing against the inner surface thereof, and said bits provided with portions adapted to operate against said bridge to expand the bits.

11. In an underreamer, the combination, of a mandrel, provided with a central bore, a central socket or chamber and an open-sided or slotted hollow extension, having a bridge across its ends, the upper end walls of the side slots forming abutting surfaces, a spring-actuated slip-operating rod slidably mounted in said central bore and provided with a key or head, and reaming-bits carried by said rod, portions of which bits extending up into said socket or chamber and bearing against the inner surfaces thereof, and said bits provided with portions adapted to operate against said bridge to expand the bits, and provided with shoulders to contact against said abutting surfaces.

12. In an underreamer, in combination, a hollow mandrel, provided with a slotted extension, a spring-actuated rod slidably arranged therein and provided with a head or key, an end block or bridge keyed to the projecting ends of said slotted extension, said end block provided with under spreading faces and side bearing portions, and reaming-bits carried on said head or key, said bits provided with portions adapted to contact with said spreading faces and said bearing portions and with portions adapted to contact with the interior of the casing as the tool passes there-through.

13. In an underreamer, the combination, of a mandrel provided with a central bore, a central socket or chamber and an open-sided hollow extension, an end or bridge block

eyed to the projecting ends of said slotted extension and provided with under spreading faces and side bearing portions, a spring-actuated bit-operating rod slidably mounted in said central bore and provided with a key head, and reaming-bits carried by said rod, portions of the bits extending up into said socket or chamber and bearing against the inner surface thereof, said bits provided with portions adapted to operate against said under spreading faces to expand the bits and said bits provided with portions adapted to contact with the interior of the casing as the tool passes therethrough.

14. In an underreamer, in combination, a hollow mandrel, provided with a slotted extension, a spring-actuated rod slidably arranged therein and provided with a head or key, an end block or bridge keyed to the projecting ends of said slotted extension, said end block provided with under spreading faces and side bearing portions, and reaming-bits carried on said head or key, said bits provided with portions adapted to contact with said spreading faces and said bearing portions, and means, contacting with the interior of the casing when the tool passes therethrough, holding the bits in contracted position.

15. In an underreamer, in combination, a

mandrel provided with a central bore, a slotted extension, and a central chamber, a spring-actuated rod slidably arranged in said central bore and provided with a key or head, an end block or bridge keyed to the projecting ends of said slotted extension, said end block provided with under spreading faces and side bearing portions, and reaming-bits carried by said head, said bits provided with portions adapted to contact with said spreading faces and bearing portions, with portions adapted to contact with the interior of the casing as the tool passes therethrough, with portions extending up into said socket or chamber and bearing against the inner surface thereof, and with shoulders adapted to bear against abutments on said mandrel when expanded, said abutments formed by the wall of the mandrel connecting the legs or walls of said slotted extension.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, at Los Angeles, in the county of Los Angeles and State of California, this 12th day of December, 1902.

EDWARD DOUBLE.

Witnesses:

FREDERICK S. LYON,

EDW. L. PAYNE.

Complainants' Exhibit Jones or Improved North Patent.

[Endorsed]: U. S. Dist. Court, So. Dist. of Cal., So. Div. No. 1540. Union Tool Co. et al. vs. Wilson & Willard Mfg. Co. "Complainants' Exhibit Jones or Improved North Patent." Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Complainants' Exhibit Jones or Improved North Patent. Filed May 8, 1917. F. D. Monekton, Clerk.

No. 809,570

PATENTED JAN. 9, 1906.

F. W. JONES.
UNDERREAMER.
APPLICATION FILED AUG. 30, 1904.

Fig. 1.

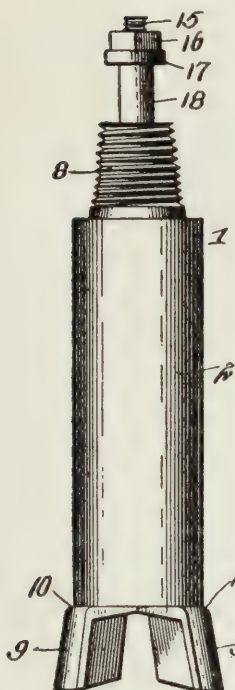


Fig. 2.

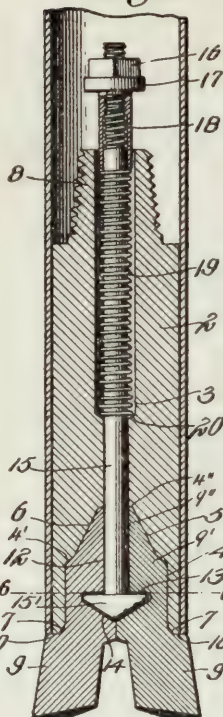


Fig. 3.

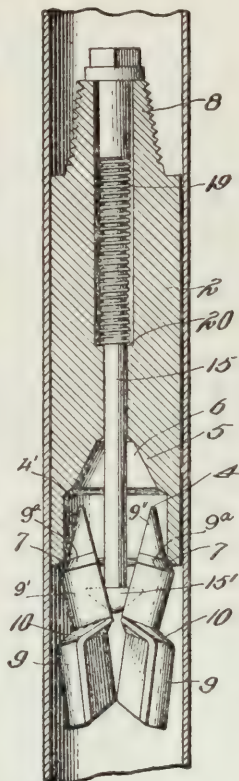


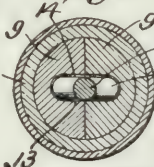
Fig. 4.



Fig. 5.



Fig. 6.



Witnesses
M. C. Lyddane
L. H. Jirabauer.

Inventor
Frederick W. Jones
by H. B. Wilson
Attorney

UNITED STATES PATENT OFFICE.

FREDERICK W. JONES, OF SANTA PAULA, CALIFORNIA, ASSIGNOR
TO EDWARD NORTH AND EDWARD DOUBLE, OF LOS ANGELES,
CALIFORNIA.

UNDERREAMER.

No. 809,570.

Specification of Letters Patent.

Patented Jan. 9, 1906.

Application filed August 30, 1904. Serial No. 222,688.

To all whom it may concern:

Be it known that I, FREDERICK W. JONES, a citizen of the United States, residing at Santa Paula, in the county of Ventura and State of California, have invented certain new and useful Improvements in Underreamers, of which the following is a specification.

This invention relates to underreamers for reaming out or enlarging well-holes under well-casings in the drilling of wells, and is more particularly designed for use in the drilling of oil-wells, the object of underreaming the hole below the well-casing being to enlarge the same in order to permit the casing to be lowered farther down.

The primary object of this invention is to provide an improved device of this class which shall be of extremely simple but durable construction, composed of few parts, simple and cheap to manufacture and assemble, and which shall be positive and efficient in operation.

Other objects and ends in view will herein-after appear from the detailed description of construction and operation.

The invention consists, primarily, of a mandrel having a central bore, a spring-actuated rod slidable in said bore, said rod provided at its lower end with a suitable head, said mandrel provided at its lower end with a chamber into which said rod extends, said chamber having a lower cylindrical portion and an upper portion of less diameter, a beveled or inclined shoulder or abutment connecting said chamber portions and against which the bits or slips bear when in expanded position, and tilting slips carried on the head of said rod and provided with shanks adapted to extend within said chamber portions, and with cutting portions extending out of said mandrel into such width that when said bits are in extended position the spread of the same is greater than the diameter of said mandrel or of the well-casing, so that the hole cut by said expanded bits will be of greater diameter than the well-casing, the said bits or slips provided with beveled shoulders adapted when said bits are pulled up into said chamber by said spring-actuated rod to come in contact with said beveled abutment and cause said bits to tilt or expand.

The invention consists, further, in the con-

structions and combinations of parts herein after described, and particularly set forth in 55 the claims.

The invention will be more readily understood by reference to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of an underreamer constructed in accordance with the invention. Fig. 2 is a central vertical sectional view of the same, showing the bits or slips in expanded or operative position and below the end of a well-tube. Fig. 3 is a similar view showing the bits or slips in extreme contracted position. Figs. 4 and 5 are respectively side and edge views of one of the bits or slips, sometimes called "cutters." Fig. 6 is a cross-sectional view on the line 6 6 of Fig. 2.

As shown in the drawings, 1 designates the underreamer, which consists of a suitable mandrel or body portion 2, having a central longitudinal bore 3, which bore is preferably of two diameters to provide a shoulder 20. The lower end of the mandrel of body 2 is provided with a central chamber, the lower portion 4 of which is preferably cylindrical in form and the upper portion 6 of which is in the form of a tapering socket or tapering chamber. The walls of the two chambers 4 and 6 are connected together by a beveled surface or abutment 4', which lies between the termination of the straight wall of the cylindrical chamber 4 and the inclined or conical wall of the chamber 6. The lower end of the wall of the chamber 4 is preferably beveled or inclined outwardly toward the outer edge of the body portion, as shown at 7. On the upper end of the mandrel or body portion 2 is formed a reduced tapering end 8, which is provided with screw-threads, whereby the same may be connected with the usual "sub" or string of oil-well tools.

9 represents the bits or slips, the upper portions of which when brought together conform to the shape of the chambers 4 and 6. These bits or slips are composed of the bits proper, adapted at all times to extend below the mandrel, and the shanks, adapted to extend within the mandrel. As shown, the shanks are composed of semicylindrical portions 9', the lengths of which correspond with the length of the cylindrical chamber 4,

and the semiconical portions 9', corresponding to the chamber 6. An inclined or beveled shoulder 9a is provided between the portions 9' and 9'' of the bits. These inclined shoulders 9a are adapted to abut against the shoulder or abutment 4' of the mandrel when the bits or cutters are in their expanded or underreaming position. The bits are projected outward at the junction of the portions 9' and the cutting portions of the bits, so as to form shoulders 10, adapted to engage the end of the mandrel and abut thereagainst, so that the impact of the blow when the underreamer is in use is carried not only by the end of the mandrel, but on the shoulders 4' and on the shoulders 4'', formed at the top of the conical chamber 6, thus distributing such impact throughout the body or mandrel 2 and preventing the localization of such strain, and by thus distributing this strain the tendency of such strain to split the mandrel is reduced to a minimum.

The outer face of the bits are preferably curved or rounded, as shown, to correspond with the arc of the enlarged hole, so as to provide a rounded hole of increased diameter under the casing. The inner walls of the bits 9 are cut or beveled inwardly toward the center, thereby forming between said projecting ends when the cutters are assembled means for cutting the dirt or mud which might be caught between the collapsing bits and squeezing the same out from the sides of the cutters, so that the bits may readily collapse and be brought together. The shanks of the bits or slips 9 are provided on their inner faces with channels 12, at the lower ends of which are formed inwardly-projecting recesses 13, the lower wall of the recesses 13 being beveled or inclined upwardly and inwardly, as shown at 14, so that when the cutters or slips are brought together the channels 12 will form a cylindrical bore or passage communicating at its lower end with the circular triangular-shaped chamber formed by the recesses 13, which is provided for the reception of the head 15' of the spring-actuated rod 15.

At the upper end of the rod 15 and about the same I provide a sleeve 18, and between the lower end of this sleeve and a shoulder or abutment 20 in the body 2 is provided a coil-spring 19, which encircles or is coiled about the rod 15. The upper end of the rod 15 is threaded and adapted to receive a retaining-nut 16, provided with an annular collar or flange 17. By the adjustment of the nut 16 on the rod 15 the required compression of the spring 19 is secured, so that such spring actuates to throw the rod 15 in the position of Fig. 2 and automatically carries the bits or slips 9 into the expanded or operative position. In fact, the position of the bits shown in Fig. 2 is the normal position thereof, being the position that the same will assume when

the underreamer is not in use or has been allowed to descend through the well-casing and below the same. It will be noted that while the action of the spring 19 and rod 15 is to automatically draw the bits or slips 9 up into the chamber or socket of the mandrel and automatically expand the bits, yet none of the strain or impact on the bits while underreaming is borne by either the rod or spring, but is borne by shoulders or abutments 4' 4'' and the end of the mandrel from the shoulders 10 of the bits.

When it is desired to contract the bits so as to permit of the insertion of the underreamer in the well-casing and the lowering thereof through the casing to underream below said casing, the bits 9 are drawn down into a contracted position in the usual manner and held in contracted position in the usual manner, as by a segmental ring of the ordinary construction slipped about the contracted bits and holding them from expansion while they are being inserted in the top of the casing, this segmental ring being taken off as soon as the bits are started in the casing and the cylindrical surfaces of the bits then contacting with the inner surface of the casing.

In order to prevent the edges of the bits 9 from perforating the casing during the descent of the underreamer, it is preferable to provide the cylindrical surfaces 9 with a slight pitch, so as to throw the edges of the bits away from the casing. This, however, is common in underreamer-bits. By providing the nuts 16 with an annular collar or flange 17 the downward movement of the plunger-rod 15 is limited by the engagement of said collar with the upper end of the mandrel 2, thereby preventing the engagement of the cutting members or bits 9 from the head 15' of the spring-actuated rod 15, which disengagement would result in loss of the bits in the well. It is thus seen that by the provision of tapering shoulder 4' in the chamber 4 and the provision of inclined or beveled shoulders 9a on the bits means are provided for causing the tilting of the bits from their collapsed or contracted position to their expanded or operative position.

While I do not confine myself to the use of the tapering or cylindrical sockets 6, I prefer to use the same.

Other changes in details of construction and arrangements may be resorted to with out departing from the principle of my invention, and I do not limit myself to the details of construction herein shown and described.

By thus providing a tilting abutment or surface 4' within the chamber of the mandrel and providing bits or slips pivotally or tiltingly supported by the spring-actuated rod I secure the positive automatic expansion of the bits to underreaming position when the rod is permitted to slide upward in the man-

drel. This construction also permits the use of bits so constructed and of such form as to abut against the walls of the chambers of the mandrel and take all the concussion or impact (when the underreamer is in use) off of the spring-actuated rod and the pivot key or head holding the bits, thereby eliminating all danger of breaking such parts.

By making the head 15' of the spring-actuated rod 15 in the form of an arrow-head and providing in the bits or slips 9 sockets or recesses 13, corresponding in form to the wings of the arrow-head, I provide for the tilting action of the slips or bits and for a strong supporting head or pivot 15' without necessitating removal of sufficient material from the bits to weaken the same, and in the manufacture of oil-well tools great strength is essential.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An underreamer of the class described comprising a centrally-bored mandrel having a cylindrical recess in its lower end, a recess above said cylindrical recess, a beveled shoulder between said upper recess and said cylindrical recess, a rod movable longitudinally in the bore of the mandrel and having a head on its lower end and a pair of cutters recessed on their opposing inner sides to receive the lower portion of said rod and the head of said rod, each of said cutters having a semicylindrical portion of a diameter to fit in the cylindrical recess of the mandrel, a semiconical upper portion to fit in the upper recess of the mandrel, a beveled shoulder to engage the upper beveled shoulder of the mandrel, a lower portion of a diameter exceeding that of the cylindrical recess of the mandrel, a beveled shoulder between the semicylindrical portion and the said portion of enlarged diameter, the said portions of enlarged diameter having their inner opposing sides oppositely beveled to form wedge-shaped openings between them.

2. An underreamer comprising a centrally-bored mandrel having a cylindrical recess in its lower end and a recess above said cylindrical recess, a beveled shoulder or abutment between said recesses, a spring-actuated rod slidable in said central bore, said rod having a head at its lower end, tilting slips tiltingly mounted on said head, said slips provided with cutting edges and with shoulders adapted to contact with said beveled shoulder or abutment.

3. An underreamer comprising in combination a centrally-bored mandrel having a cylindrical recess in its lower end and a second and smaller recess above said cylindrical recess, an inclined or beveled shoulder or abutment being provided between said recesses, a spring-actuated rod slidable in said mandrel, said rod provided with a pivot-head

and underreaming bits of slips tiltingly mounted on said head, said bits provided with underreaming-faces and with shanks adapted to extend up into said recesses, said shanks having reduced upper portions adapted to fit within the upper recess.

4. An underreamer comprising a hollow mandrel, a spring-actuated rod slidable therein, said mandrel having at its lower end a cylindrical chamber and an inner and smaller chamber above said cylindrical chamber, an inclined or beveled abutment formed between the adjoining ends of the walls of said chambers, reaming-bits mounted on said rod and provided with surfaces adapted to contact with said inclined shoulder or abutment to tilt said bits.

5. An underreamer comprising a mandrel having a recess or chamber in its bottom and an inclined or beveled abutment in the said chamber, a spring-actuated rod slidable in said mandrel, said spring-actuated rod having a head of a form similar to an arrow-head tilting slips or bits having sockets corresponding to the wings of said arrow-head into which said arrow-head is adapted to fit, said slips or bits provided with shanks adapted to be drawn up into said chamber and provided with inclined shoulders adapted to abut against said beveled or inclined shoulders in said chamber to tilt said slips or bits on said arrow-heads as said slips or bits are drawn inward into said chamber.

6. An underreamer comprising a hollow mandrel furnished in its lower end with a chamber provided at an intermediate portion with an inclined or beveled portion or abutment, a spring-actuated rod sliding through said chamber and extending up in said mandrel, two jaws pivoted to said rod respectively furnished at their upper ends with shanks extending above the pivot and into said chamber and furnished at their intermediate portions and above said pivot with inclined shoulders adapted to contact with said inclined abutment in said chamber.

7. An underreamer comprising a hollow mandrel furnished in its lower end with a chamber provided at an intermediate portion with an inclined or beveled portion or abutment, a spring-actuated rod sliding through said chamber and extending up in said mandrel, two jaws pivoted to said rod respectively furnished at their upper ends with shanks extending above the pivot and into said chamber, furnished above said pivot with inclined shoulders adapted to contact with said inclined abutments in said chamber, said shanks of said bits being of sufficient length to abut against the surface of the end wall of said chamber.

8. An underreamer comprising a mandrel provided in its lower end with an inwardly-extending chamber or socket, said chamber provided intermediate its length with an in-

clined or beveled abutment, a spring-actuated rod slidably mounted in said mandrel and extending through said socket or chamber up into the mandrel, two slips or bits pivoted to said rod and respectively furnished at their upper ends with shanks extending above the pivotal point to enter the upper end of said socket or chamber, said bits provided above said pivotal point with inclined shoulders adapted to abut against said inclined abutment in said socket or chamber to tilt said bits, said bits also provided with shoulders adapted to abut against the end of said mandrel.

9. An underreamer comprising a centrally-bored mandrel having a cylindrical recess in its lower side and a recess above said cylindrical recess, a shoulder or abutment between said recesses, a spring-actuated rod slidable in said central bore, said rod having a head at its lower end, tilting slips tiltingly mounted on said head, said slips provided with cutting edges and with inclined or beveled shoulders adapted to contact with said shoulders or abutment.

10. An underreamer comprising in combination a mandrel having a cylindrical chamber in its lower end and a tapering chamber above said cylindrical chamber and forming an inward extension thereof, a spring-actuated rod slidably mounted in said mandrel and extending up from said cylindrical chamber into said mandrel, reaming bits or slips tiltingly mounted on the lower end of said rod, said bits or slips having shanks extending above said lower end of said rod, said shanks having tapered upper ends corresponding to said tapered chamber, said bits or slips adapted to contact with the walls of said chambers and provided with shoulders adapted to contact with the end of said mandrel when said bits are in operative position.

11. An underreamer comprising a mandrel, a spring-actuated rod slidable therein, said mandrel having at its lower end a cylindrical chamber and an inner and smaller chamber above said cylindrical chamber, an abutment formed between the adjoining ends of the walls of said chambers, reaming-bits mounted on said rod and provided with surfaces adapted to contact with said abutment to tilt said bits.

12. An underreamer comprising in combination a mandrel having a cylindrical chamber in its lower end and a tapering chamber above said cylindrical chamber and forming an inward extension thereof, a spring-actuated rod slidably mounted in said mandrel and extending up from said cylindrical chamber into said mandrel, the end of said rod in said cylindrical chamber being formed in the shape of an arrow-head, reaming bits or slips having sockets to receive the wings of said arrow-head and tiltingly mounted thereon,

said bits or slips having shanks extending above said lower end of said rod and into said tapering chamber, the upper ends of said shanks being tapered to correspond to said tapered chamber, said bits or slips adapted to contact with the walls of said chambers and abut against the end wall of said tapered chamber and provided with shoulders adapted to abut against the end of the mandrel when in operative position.

13. An underreamer comprising a centrally-bored mandrel having a cylindrical chamber in its lower end and a recess above said cylindrical recess, a beveled or inclined shoulder or abutment formed between said recesses, a spring-actuated rod slidably mounted in said central bore, said rod having an arrow-head-shaped end in said cylindrical chamber, bits or slips having sockets corresponding to and adapted to receive the wings of said arrow-head and having shanks extending up into said cylindrical chamber and recess thereabove and provided with shoulders to abut against said abutment, said bits or slips abutting against the end wall of said recess when in operative position.

14. An underreamer comprising in combination, a mandrel, a spring-actuated rod slidable therein, said mandrel having in its lower end a cylindrical chamber and an inner and smaller chamber above said cylindrical chamber, an inclined or beveled abutment formed between the adjoining walls of said chambers, said rod provided with an arrow-head-shaped end, reaming-bits provided with sockets corresponding to and adapted to receive the wings of said arrow-head and thereby tiltingly supported on said rod, said bits provided with surfaces adapted to contact with said inclined shoulder or abutment to cause the bits to tilt.

15. An underreamer comprising a mandrel provided in its lower end with an inwardly-extending socket or chamber, said chamber provided intermediate its length with an inclined shoulder or abutment, a spring-actuated rod slidably mounted in said mandrel and extending through said socket or chamber up into the mandrel, two slips or bits pivoted to said rod and respectively furnished at their upper ends with shanks extending above the pivotal point to enter the upper end of said socket or chamber, said bits or slips provided with inclined shoulders above said pivot-point to abut against said inclined abutment in said socket or chamber to tilt said bits.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FREDERICK W. JONES.

Witnesses:

D. W. HUFFMAN,
ARTHUR H. BLANCHARD.

**Complainants' Exhibit A. Willard U. S. Patent
762,458.**

[Endorsed]: U. S. Dist. Court, So. Dist. of Cal.,
So. Div. #1540—In Equity. Union Tool Com-
pany et al. vs. Wilson & Willard Mfg. Co. "Com-
plainants' Exhibit A. Willard U. S. Patent 762,458."
Leo Longley, Special Examiner. Filed Apr. 16,
1913. Wm. M. Van Dyke, Clerk. By Chas. N.
Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the
Ninth Circuit. Complainants' Exhibit A. Willard
U. S. Patent 762,458. Filed May 8, 1917. F. D.
Monckton, Clerk.

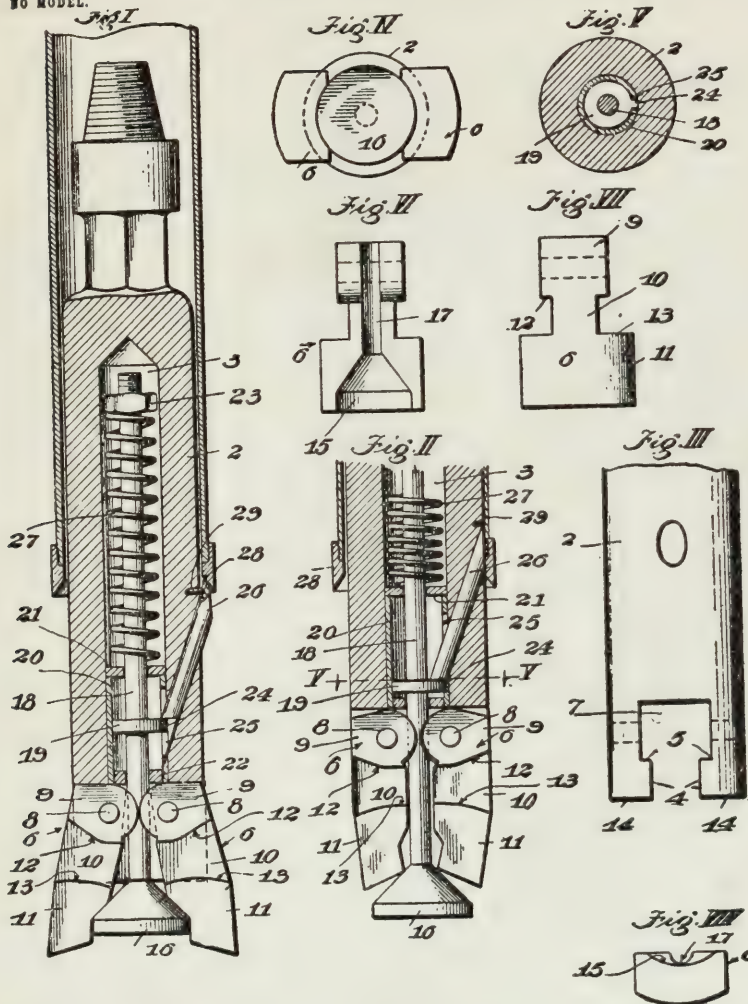
No. 762,458.

PATENTED JUNE 14, 1904.

A. WILLARD.
UNDERBEAMER.

APPLICATION FILED MAY 6, 1903.

NO MODEL.



Witnesses

Edmund A. Thomas
Frederick R. Hyde

Inventor

Arthur Willard

by Townsend Bros.
his attor.

UNITED STATES PATENT OFFICE.

ARTHUR WILLARD, OF LOS ANGELES, CALIFORNIA.

UNDERREAMER.**SPECIFICATION** forming part of Letters Patent No. 762,458, dated June 14, 1904.

Application filed May 5, 1903. Serial No. 155,719. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR WILLARD, a citizen of the United States of America, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Underreamer, of which the following is a specification.

My invention relates to underreamers for reaming out the holes of oil and Artesian wells, &c., larger than the casing to permit the lowering of the casing.

The general object of my invention is to provide an underreamer of exceedingly simple, cheap, and durable construction which shall be composed of few parts of such construction and interrelation as to avoid becoming displaced in the device and getting out of working order.

A further object of the invention is to provide an underreamer of the class in which the reaming-bits are pivoted upon the mandrel-body proper and are expanded by an automatically-operating wedge, the bits being so pivoted in the mandrel that the strain of underreaming is substantially taken off the pivots and borne by the mandrel-body proper.

Other and further objects and ends in view will hereinafter appear from the detail description.

The invention consists in general and specific combinations of parts and constructions, all as hereinafter described, and particularly pointed out in the claims, and will be more readily understood by reference to the accompanying drawings, forming a part of this specification, and in which—

Figure I is a longitudinal sectional view of an underreamer embodying my invention, the same being shown in connection with a section of a well-casing and in position for underreaming. Fig. II is a partial longitudinal sectional view showing the bits contracted for passage through the well-casing. Fig. III is a partial side elevation of the mandrel, the reaming-bits being removed. Fig. IV is a bottom view with the reaming-bits in expanded position. Fig. V is a plan view taken on the line VV of Fig. II. Figs VI and VII are side elevations of the reaming-bits which

I employ. Fig. VIII is a bottom view of one of the reaming-bits.

As shown in the drawings, 2 represents the mandrel, which is provided with a central chamber 3, which extends longitudinally thereof, as shown. The lower end of the mandrel is shown best in Fig. III. This slotted portion is provided with inward projections 4 at the end of the mandrel, whereby abutments 5 are formed for the purpose hereinafter set forth. The reaming-bits 6 are pivoted within the chamber 7 thus formed above the abutments 5 by pins 8, which pass through eyes or holes in the bits and have bearings on the opposite walls of the mandrel, as indicated by dotted lines in Fig. III.

As shown in Figs. VI and VII the reaming-bits are composed of the head portion 9, the intermediate portion 10, and the blade portion 11. The intermediate portion is cut away to provide the shoulders 12, which, as shown best in Figs. I and II, have the two inclinations shown.

13 represents shoulders on the upper ends of the blade portions 11 adapted to contact or abut against the ends 14 of the mandrel. The inner sides of the bits are provided with sockets or seats 15, adapted to receive the spreader or wedge 16 when the bits are expanded, and the grooves 17 in which the stem or rod 18 rests. The stem or rod 18 is adapted to work in the chamber 3 and is provided with a shoulder or flange 19, preferably formed integral therewith.

20 represents a barrel or cylinder about the rod 18 and extending up for a portion of its length thereof. This barrel or cylinder is provided with a top plate 21 and a bottom plate 22. The top plate 21 may be formed integral with the barrel or loose or may be detachably secured on the top of the barrel, as desired. The bottom plate 22 is preferably threaded onto the bottom of the barrel. Above the barrel 20 a coiled spring 27 is interposed about the rod 18 and bears against a head 23 on the rod. This head is preferably in the form of a nut, engaging a thread on the end of the rod, and by turning the nut

down on the rod any desired tension of the spring can be secured. The wedge or spreader 16 is preferably formed integral with the rod 18 and adapted when in the position of Fig. 1 to rest on the seats 15 of the bits.

The barrel 20 is provided with a longitudinal slot and the collar or flange 19 provided with a projection 24, extending through this slot and adapted to work therein. The mandrel 2 is provided with a way 25, which extends inward from the outer surface at an acute angle, as shown, and in this way is provided a pin 26, which bears against the projection 24 and collar or flange 19 and extends when the underreamer is passing through the casing into contact with the inner surface of the casing, causing the rod 18 to be forced down, throwing the spreader or wedge 16 out of the seats 15 of the bits, so that the bits drop of their own weight into their contracted positions. The rod 26 thus forms automatic means whereby upon coming in contact with the casing the spreader or wedge is forced down against the tension of the spring 27. Toward the upper end of the pin 26 a slot 28 is provided, and a pin 29, extended out from the mandrel, is adapted to operate in this slot and prevents the pin 26 from being thrown out of the way 25 when the spring 27 forces the rod 18 up, the operating-pin 26 having passed out from the casing.

The mandrel 2 may be connected to the "sub" in the ordinary or any preferred manner.

It is seen that by making the transverse slots of greater width than the downward or vertical slots abutments 5 are provided upon which the shoulders 12 of the bits contact or bear. The pins 8 are thus relieved from the strain of the weight of the bits when the underreamer is being lowered into the casing or pulled up out therefrom.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In an underreamer, in combination, a hollow mandrel having a slotted portion at its lower end, reaming-bits pivoted to said mandrel within said slotted portion, said bits provided with shoulders adapted, when in expanded position, to abut against the end of said slotted portion and extending through said slotted portion and expanding laterally there through, automatic means carried within said mandrel and adapted to normally hold said bits in expanded position, and means adapted to contact with the casing and automatically disengage said expanding means and permit said bits to contract.

2. In an underreamer, in combination, a hollow mandrel, the lower end having a downwardly and transversely slotted portion, said transverse slot being of greater width than the downward or vertical slot, reaming-bits pivoted to said mandrel and extending through said slots, said reaming-bits provided with

shoulders adapted to contact with the abutments or shoulders formed by the walls of said slots, said bits provided with shoulders adapted, when said bits are expanded, to abut against the slotted end of said portion, automatic means carried within said mandrel adapted to normally hold said bits in expanded position, and means adapted to contact with the casing and automatically disengage said expanding means and permit said bits to contract.

3. An underreamer, comprising in combination, a mandrel provided with a central bore and having a transversely-slotted lower portion, having a vertical slot of less width communicating from its lower end into said transverse slot, whereby shoulders are provided by the walls of said slot, reaming-bits pivoted to said mandrel within said transverse slot, said reaming-bits provided with portions adapted to bear upon said shoulders and with shoulders adapted, when said bits are expanded, to abut against the end of said mandrel, and means for expanding and contracting said bits.

4. An underreamer, comprising in combination, a mandrel provided with a central bore and having a transversely-slotted lower portion having a vertical slot extending inward from the end and communicating into said transverse slot, reaming-bits pivotally mounted on said mandrel within said transverse slot and provided with shoulders adapted when in position for underreaming to abut against the end of the mandrel, and means for expanding and contracting the bits.

5. An underreamer, comprising in combination, a mandrel provided with a central bore, reaming-bits pivotally mounted in the lower end of said mandrel, a rod slidably mounted in said central bore and provided with means for expanding said bits, said rod provided with a head or nut at its upper end, a barrel or cylinder about said rod and fixed in said central bore, a spring interposed about said rod and bearing against the top of said barrel and against said head or nut, and means extending through said mandrel and operating within said barrel below the top thereof and adapted to operate against said rod and adapted upon contact with the casing to force said rod against the tension of said spring to permit said bits to contract.

6. An underreamer, comprising in combination, a mandrel provided with a central bore, reaming-bits pivotally mounted in the lower end of said mandrel, a rod slidably mounted in said central bore and provided with means for expanding said bits and with a head or nut on its upper end, a barrel or cylinder about said rod and fixed in said central bore, said barrel provided with a longitudinal slot, a spring interposed about said rod and bearing upon the top of said barrel and against said head or nut on said rod, said mandrel provided with an inclined way communicating into said central bore, and an operating-pin

mounted in said way and operating upon said rod and adapted to contact with the casing to force said rod against the tension of said spring and permit the bits to contract.

- 5 7. An underreamer, comprising in combination, a mandrel provided with a central bore, reaming-bits pivotally mounted in the lower end of said mandrel, a rod slidably mounted in said central bore and provided with means 10 for expanding said bits and with a head or nut on its upper end, a barrel or cylinder about said rod and fixed in said central bore, said barrel provided with a longitudinal slot, a spring interposed about said rod and bearing upon the top of said barrel and against a head or nut on said rod, said mandrel provided with an inclined way or perforation, an operating-pin mounted in said way and bearing against a portion of said rod and adapted 20 to contact with the casing to force said rod against the tension of said spring to permit the bits to contract, and means for preventing the tension of said spring throwing said operating-pin out from said way when said 25 bits are expanded.

8. An underreamer, comprising in combination, a mandrel provided with a central bore, reaming-bits pivotally mounted in the lower end of said mandrel, a rod slidably mounted

in said central bore and provided with means 3 for spreading said bits and with a head or nut on its upper end, a barrel or cylinder surrounding a portion of said rod, said rod provided with a flange or shoulder within said barrel, said barrel provided with a longitudinal slot, said flange or shoulder projecting into said slot, a spring interposed about said rod above said barrel and bearing upon the upper end or head thereof and operating 3 against said head or nut upon said rod, said mandrel provided with a perforation or way, an operating-pin in said way or perforation adapted to bear against said flange or shoulder and to contact with the casing to force said rod against the tension of said spring to 4 permit the bits to contract, and means for preventing said spring throwing said operating-pin out from said perforation or way when the bits are expanded. 4

In witness whereof I have hereunto set my 50 hand, this 29th day of April, A. D. 1903, in Los Angeles, in the county of Los Angeles and State of California.

ARTHUR WILLARD.

In presence of—

FREDERICK S. LYON,
GEORGE T. HACKLEY.

**Complainants' Exhibit Blakeslee, Letter of February
3, 1913.**

Phone A-3212.

Federal Court Practice

Patent Causes

Patents

Trade Marks

Copyrights

RAYMOND IVES BLAKESLEE

Lawyer and Patent Solicitor.

728-729-730 California Building

Cor. So. Broadway and Second St.

Los Angeles, Cal., Feb. 3, 1913.

Union Tool Company,

Palmetto & Mateo Sts.,

Los Angeles, Cal.

Gentlemen:

My client, Elihu C. Wilson, patentee and owner of U. S. Letters Patent No. 827,595, issued to him July 31, 1906, for Underreamers, has instructed me to again call to your attention and give you notice of the issuance to him of said Letters Patent No. 827,595; and further has instructed me to give you this notice, in addition to notice heretofore given you, that you are infringing said Letters Patent No. 827,595, in and by the manufacture, use, sale and leasing of underreamers.

My said client has further instructed me to call upon you to desist from any and all acts of infringement of said Letters Patent, and to account to him for all damages and profits for present and past in-

fringement of said Letters Patent and flowing from the manufacture, use, sale and leasing by you of any and all such underreamers.

It is further requested that you signify in the immediate future, in writing, that you will comply with the notice and demand herein made, and will respect said Letters Patent and the monopoly therein and thereby granted to my client. Unless you so signify in writing, to my client or myself within ten days Union Tool Co. #2.

from date, your failure so to do will be construed as an intention to continue said infringing acts and to refuse to comply with the notice and demand herein given and made. In the event of your failure to comply with the notice and demand herein given and made, suit will be commenced against you, and the court of competent authority will be petitioned for an injunction restraining you from further acts of infringement of said Letters Patent, and for an accounting of all profits and damages in the premises, and such further relief as may be proper.

This notice is directed to you, and to your officers, attorneys, agents, workmen and employees.

Very respectfully,

RAYMOND IVES BLAKESLEE,

RIB/DC.

[Endorsed]: U. S. Dist. Court, So. Dist. of Cal., So. Div. No. 1540—Equity. Union Tool Company et al., vs. Wilson & Willard Mfg. Co. “Complainants’ Exhibit Blakeslee Letter of February 3, 1913.” Leo Longley, Special Examiner. Filed Apr. 16,

1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Complainants' Exhibit Blakeslee. Ex. Letter of Feb. 3, 1913. Filed May 8, 1917. F. D. Monekton, Clerk.

Complainants' Exhibit Double Patent No. 862,317.

[Endorsed]: U. S. Dist. Court, So. Dist. of Cal. Union Tool Co. vs. Wilson & Willard Mfg. Co. Complainants' Exhibit Double Patent No. 862,317. Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

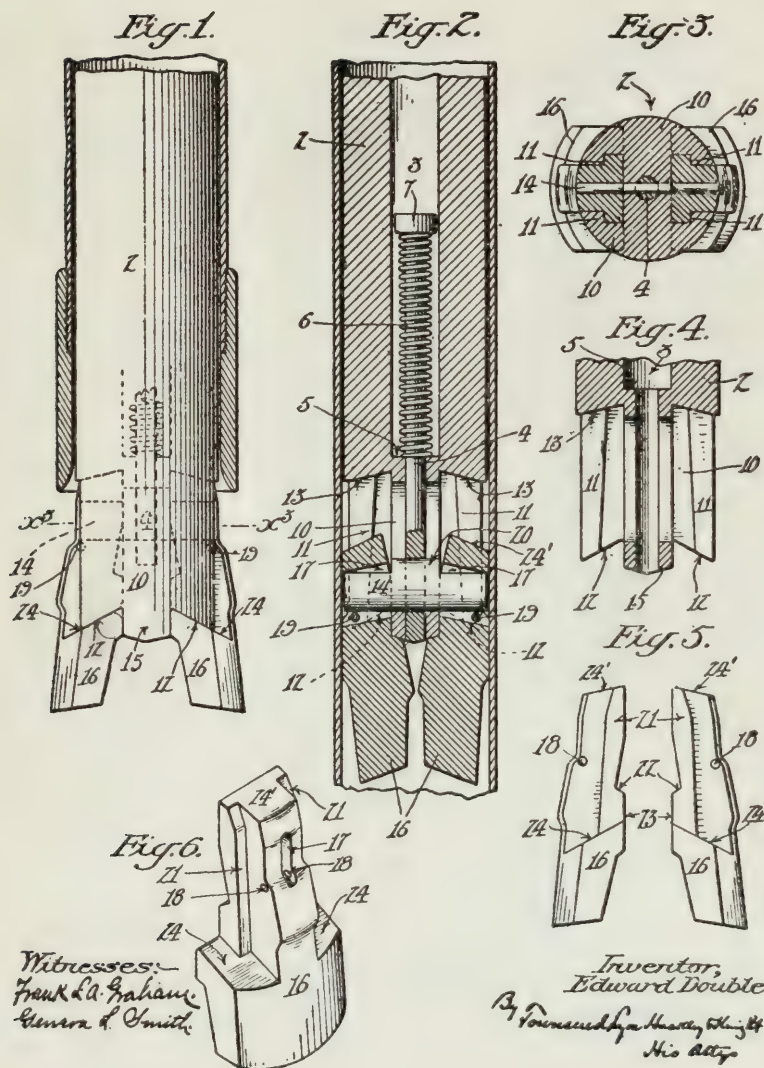
No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Complainants' Exhibit Double Patent No. 862,317. Filed May 8, 1917. F. D. Monckton, Clerk.

No. 862,317

PATENTED AUG. 6, 1907.

E. DOUBLE.
UNDERREAMER.
APPLICATION FILED SEPT. 10, 1906.

2 SHEETS—SHEET 1.



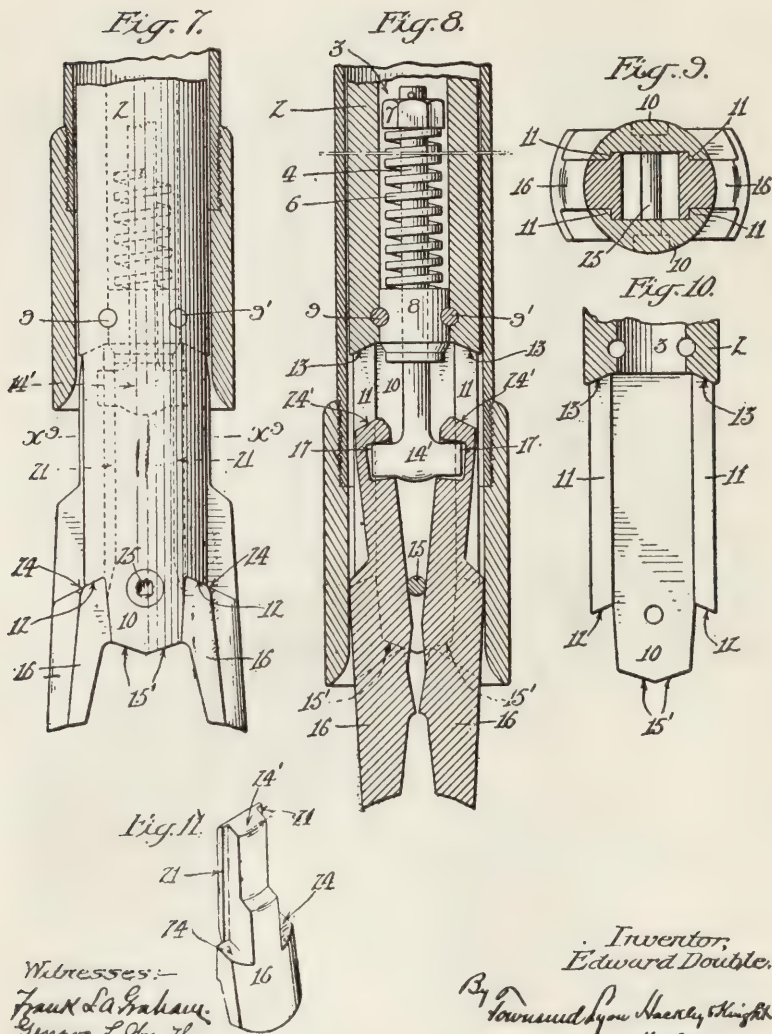
No. 862,317.

PATENTED AUG. 6, 1907.

E. DOUBLE.
UNDERREAMER.

APPLICATION FILED SEPT. 10, 1906.

2 SHEETS—SHEET 2.



Witnesses:
Frank L. Graham,
Gen. & Smith

Inventor,
Edward Double.
By Howard Lyon Harkley, Knight
His atty

UNITED STATES PATENT OFFICE.

EDWARD DOUBLE, OF LOS ANGELES, CALIFORNIA.

UNDERREAMER.

No. 862,317.

Specification of Letters Patent.

Patented Aug. 6, 1907.

Application filed September 10, 1906. Serial No. 334,045.

To all whom it may concern:

Be it known that I, EDWARD DOUBLE, a citizen of the United States of America, residing in the city of Los Angeles, in the county of Los Angeles, State of California, have invented certain Improvements in Underreamers, of which the following is a specification. This invention relates to underreamers for enlarging the bore of wells to permit the lowering of casing.

The object of this invention is to provide an underreamer which, when expanded to working position, shall possess the maximum strength, and in which the shock or impact shall be taken up by heavy solid portions of the body and bits or jaws and entirely removed from those portions of the reamer necessarily weakened to permit the jaws to expand and contract when the tool is lowered into and raised out of the well hole.

A further object of the invention is to render the expansion and contraction of the jaws certain and eliminate all possibility of the loss of the moving elements or parts in the well hole.

Preferably my improved underreamer comprises a body or mandrel having a central bore or chamber providing an open chamber within which longitudinally movable jaws or bits may tilt or swing to permit of their pivotal movement in expanding or contracting, and a hollow slotted extension or lower end, the two sides or wings of which are provided with shoulders forming dovetail ways, terminating at their upper or inner ends in inwardly inclined abutments on the mandrel proper, a spring actuated rod mounted in said bore or chamber, and jaws or bits pivotally mounted on said rod and provided with dovetail shoulders adapted to travel along said dovetail ways of the wings of the mandrel, and with portions adapted to contact with the lower end of the mandrel and thereby expand; the upper ends of the shanks of said bits or jaws having inwardly inclined surfaces corresponding to and adapted to bear upon said inwardly inclined abutments when the jaws are expanded, inwardly inclined shoulders being provided on the bits to bear against the corresponding inclined abutments formed at the extreme end of said slotted extension or lower end of the mandrel.

The invention will be more readily understood by reference to the accompanying drawings, forming a part of this specification and in which:—

Figure 1 is a side elevation of an underreamer embodying my invention, the same being shown with the bits or jaws projecting out of a well casing and in expanded position, the upper end of the mandrel being broken away. Fig. 2 is a longitudinal sectional view of an underreamer embodying my invention, the same being shown within a well casing. Fig. 3 is a sectional plan view on the line x^2-x^3 of Fig. 1. Fig. 4 is a longitudinal sectional view of the mandrel, the upper portion of which is broken away, the view showing particu-

larly the interior dovetail ways on the inner faces of one side or wing of the hollow extension or slotted end of the mandrel, and the inclined abutments at the inner or upper end of the dovetail ways and the inwardly inclined abutments at the extreme lower end of the mandrel. Fig. 5 shows side elevations of the jaws or bits. Fig. 6 is a perspective view of one of the jaws or bits. Fig. 7 is a side elevation of another embodiment of my invention, the same being shown with the bits or jaws in expanded position outside the well casing, the upper end of the mandrel being broken away. Fig. 8 is a longitudinal sectional view of the underreamer of Fig. 7. Fig. 9 is a sectional plan view taken on the line x^2-x^3 of Fig. 7. Fig. 10 is a longitudinal sectional view of the mandrel, the upper portion of which is broken away, the view showing particularly the interior dovetail ways on the inner faces of one side or wing of the hollow extension or slotted end of the mandrel, and the inclined abutments at the inner or upper ends of the dovetail ways and the inwardly inclined abutments at the lower end of the mandrel. Fig. 11 is a perspective view of one of the bits or jaws of Figs. 7—9.

In the drawings, 2 represents the mandrel proper which is provided with the usual screw threaded pin (not shown) at its upper end to screw into the socket of the "sub."

3 represents the central chamber or bore in which the spring actuated rod 4 is mounted. This bore terminates, preferably in a shoulder 5 (Figs. 2 and 3) against which the spring 6 coiled about the rod 4, bears the rod 4 operating through a reduced opening or bore. The upper end of the spring 6 bears against the head 7. (It is of course understood that the head 7 if desired may be in the form of a nut screwed onto the end of the rod 4). In Figs. 7 and 8 I have shown a block 8 which is removably held in the lower end of the bore 3 by dowel pins 9, 9', this block being provided with a central bore through which the rod 4 operates. Slightly below this shoulder 5, (Figs. 1, 2 and 4) or block 8, (Figs. 7, 8 and 10) I provide a hollow slotted extension of the mandrel proper, forming however an integral part and the lower end of the mandrel of the reamer. This extension has two similar sides or wings 10, provided on their inner faces with dovetail ways 11. These dovetail ways 11 are preferably inclined as shown in Figs. 1, and 4. These wings terminate in inwardly inclined shoulders or abutments 12 and similar inwardly inclined shoulders or abutments 13 are on the end of the mandrel proper at the upper ends of the dovetails 11 and between the wings or sides of the hollow extension.

In Figs. 1 and 2 I have shown the rod 4 as provided with a separate head or key 14, which in Figs. 7 and 8 the head or key 14' is shown integral with the rod 4. I prefer however to use the removable head or

key 14 and to provide an integral bar 15 bridging between the sides or wings 10 of the hollow extension, thus forming a shoulder preventing the loss of the rod 4 from the underreamer if the head 7 should break or if the nut (if used in place of the integral head) should unscrew and become detached. This also prevents the simultaneous loss of the bits in the well hole, as hereinafter set forth. The lower surface of the bar 15 may be double inclined, as shown, to enable me to utilize this surface as a means for causing the expansion of the bits or jaws. Where such bar 15 is not provided the extreme ends of the wings 10 are each double inclined for this purpose, as shown at 15' in Figs. 7 and 9.

The jaws or bits 16 are provided with sockets 17 somewhat larger than the head or key 14 to permit the pivotal movement or tilting of the bits or jaws. When a removable key 14 is used I prefer to provide the bits with holes 18 located just above the line of the lower edge of the head or key 14, when in place, and to insert pins 19 through these holes. As shown in Fig. 2 the removable head or key 14 is provided with an offset or wing 20 on its upper edge. This offset projects above the sockets or key seats 17 and prevents the accidental slipping of the head or key 14 from the rod 4 and bits 16. In order to remove the bits from the reamer it is necessary to first drive out the pins 19.

The upper ends of the shanks are inclined, as at 24', to correspond with the shoulders 13 and the sides of the shanks and provided with dovetail shoulders 21 to engage the dovetail ways 11 on the sides or wings 10 of the hollow slotted extension of the mandrel proper.

As shown in Figs. 1, 2, 3, 5 and 6, the bits 16 are provided with inclined expansion shoulders 22 and bearing faces 23, and as shown in Figs. 1—3, 5—9 and 11 with inclined shoulders 24 at the sides of the bits, the angle of inclination of these shoulders 24 corresponding with the inclination of the abutments 12 on the wings or sides 10 of the extension of the mandrel.

Preferably when the bar 15 is employed the same is extended up to the body portion of the mandrel proper, and is provided with a center bore in which the rod 4 operates, and also provided with a slot in which the head or key 14 works. Another advantage of this embodiment of my invention is that, as illustrated best in Fig. 3, when the bits are expanded the surfaces 23 bear upon the surfaces of the upward extension of the bar 15 and form substantially a solid bit or drill adapted to withstand the greater strains of underreaming.

With a construction, as shown in Figs. 7—10, wherein the bar 15 is not employed, the shoulders 24 are relied upon to cause the expansion of the bits as the same are drawn up by the spring 6 when the bits have passed out of the well casing, the shoulders 24 then riding up the inclined faces 15' of the ends of the wings 10 of the extension of the mandrel. In this form a detachable cross piece 25, in the form of a bolt, passes through the wings 10 near their lower ends. This cross piece 25 serves as a brace for the sides or wings of the extension of the mandrel. It also prevents accidental removal or loss of the jaws should the nut 7 become loose or the rod 4 break.

By thus providing the shoulders or abutments 12, 13 inclined or beveled inwardly and upwardly and the corresponding inclined shoulders or surfaces 24, 24' on the bits or jaws, the impact of the underreamer when at work causes the bits to be forced in towards the center of the mandrel and the strain to be taken at the points of greatest strength, avoiding all possibility of breaking the dovetails.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A bit or jaw, for an under reamer, having a body portion and a shank, the end of the shank beveled inwardly and upwardly, dovetail shoulders at the sides of the shank, inclined shoulders or abutments extending out laterally beyond the width of the shank and beveled to correspond with the bevel of the end of the shank, and an expansion surface on its inner face. 75
2. A bit or jaw, for an under reamer, having a body portion and a shank, the end of the shank beveled inwardly and upwardly, dovetail shoulders at the sides of the shank, inclined shoulders or abutments extending out laterally beyond the width of the shank and beveled to correspond with the bevel of the end of the shank, an expansion surface on its inner face, and a head or key seat opening at the inner surface of the shank. 80
3. A bit or jaw, for an under reamer, having a body portion provided with cutting edges and with an expansion surface or shoulder, and a shank provided with a head or key seat extending through the shank and with holes passing through the shank at the bottom of the key seat to receive key retaining pins. 85
4. A bit or jaw, for an under reamer, having a body portion provided with inwardly inclined abutments and expansion surface, and a shank having its upper end beveled to correspond with the inclination of said abutments, said shank provided with a key or head receiving seat or socket. 90
5. An underreamer bit having two inwardly and upwardly inclined shoulders and a bearing-face on the inner side of each of said shoulders. 95
6. An under reamer bit or jaw having two inwardly and upwardly inclined shoulders and a bearing-face on the inner side of each of said shoulders, and also provided with a socket for the seating of a key or head. 100
7. An under reamer bit or jaw having two inwardly and upwardly inclined shoulders and a bearing-face on the inner side of each of said shoulders and also provided with a socket for seating a key and with pin-holes at the lower edge of said socket adapted to receive pins to prevent the accidental loss of the key or head from said socket. 105
8. In an under reamer, a mandrel furnished with a hollow slotted extension, and bits tiltingly and slidably connected with the mandrel and having their upper ends inwardly and upwardly inclined and also provided with shoulders or abutments inwardly and upwardly inclined, said extension having correspondingly inclined abutments between its wings or sides at its upper end and correspondingly inclined abutments at the lower ends of its wings or sides against which the upper ends and the inclined abutments of said bits bear when expanded. 110
9. In an under reamer, a mandrel furnished with a hollow slotted extension, and bits tiltingly and slidably connected with the mandrel and having their upper ends inwardly and upwardly inclined and also provided with shoulders or abutments inwardly and upwardly inclined and also provided with dovetail shoulders, said extension having correspondingly inclined abutments between its sides or wings at its upper end against which the upper ends of the bits are adapted to bear when expanded and correspondingly inclined abutments at the lower ends of its sides or wings against which the inclined abutments of the bits bear when expanded, said mandrel extension provided with dovetail ways on the inner faces of its sides or wings coacting with the dovetail shoulders of the bits. 115
10. An under reamer mandrel having a central bore and a hollow slotted extension at its bottom, the wings or sides of said extension having dovetail ways on their inner faces and upwardly and towardly inclined abut- 120

862,317

8

ments at their lower ends, inwardly and upwardly inclined abutments being formed between the sides or wings of the extension at the upper end thereof.

5 11. An under reamer mandrel having a central bore and a hollow slotted extension at its bottom, the wings or sides of the extension having inwardly and upwardly inclined abutments at their lower ends, inwardly and upwardly inclined abutments being formed at the upper end of said extension between the sides thereof.

10 12. An under reamer comprising a mandrel having a central bore and a lower extension consisting of two wings or sides having dovetail ways on their inner faces and having inwardly and upwardly inclined abutments at their ends, a spring actuated rod slidably mounted in the central bore of said mandrel and a head or key therefor, bits or jaws provided with seats or sockets for said key or head permitting said jaws to tilt on said key or head, said bits or jaws provided with dovetail shoulders and with inwardly and upwardly inclined abutments corresponding to and coacting with the dovetail ways and inclined abutments of said mandrel.

15 13. An under reamer comprising a mandrel having a central bore and a lower extension consisting of two wings or sides having dovetail ways on their inner faces and inwardly and upwardly inclined abutments at their ends, a spring-actuated rod slidably mounted in said central

bore, a removable key or head therefor, bits or jaws provided with key-seats or sockets somewhat larger than said key permitting the jaws to tilt on said key, retaining pins passing through the jaws and through the lower portions of the key-seats and preventing the accidental slipping of the key from said rod and seats, said bits or jaws provided with dovetail shoulders and with inwardly and upwardly inclined abutments corresponding to and adapted to coact with the dovetail ways and inclined abutments of said mandrel. 30 35

14. An under reamer comprising a mandrel, bits slidably mounted on opposite sides of a portion of said mandrel and furnished on their inner faces with key-seats, said key seats being somewhat larger than the key on the operating rod, a spring-actuated operating rod playing lengthwise of the mandrel and furnished with a key-seat, and a key having a wing or flange at its center mounted in said key-seat on said rod, said bits having retaining pins passing through their key-seats and preventing the accidental removal of said key from said rod or bits. 40 45

In testimony whereof, I have hereunto set my hand at Los Angeles California this 4th day of September 1906.

EDWARD DOUBLE.

In presence of—

FREDERICK S. LYON,
FRANK L. A. GRAHAM.

**Complainants' Exhibit Wilson File Wrapper and
Contents.**

2—390.

UNITED STATES OF AMERICA,
DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true
copy from the Records of this Office of the File
Wrapper and Contents in the matter of the

Letters Patent of

Elihu C. Wilson,

Number 827,595,

Granted July 31, 1906,

for

Improvement in Underreamers.

IN TESTIMONY WHEREOF I have hereunto set
my hand and caused the seal of the Patent Office
to be affixed at the City of Washington, this 11th day
of November, in the year of our Lord one thousand
nine hundred and twelve and of the Independence of
the United States of America the one hundred and
thirty-seventh.

[Seal]

C. C. BILLINGS,

Acting Commissioner of Patents.

[Endorsed]: U. S. Dist. Ct., So. Dist. Cal., So.
Div. 1540—Equity. Union Tool Co., v. Wilson
& Willard. "Complainants' Exhibit File Wrapper
Contents." Leo. Longley, Special Examiner.
Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By
Chas N. Williams, Deputy Clerk.

2-437.

Div.

NUMBER (SERIES OF 1900).

1905

DIV. 38

289,380

(EX'R'S BOOK). 219-1

PATENT No. 827,595

Name—Elihu C. Wilson

of Bakersfield

County of

State of California

Invention—Underreamer

Division of App., No. , filed
PARTS OF APPLICATION FILED.

ORIGINAL.

RENEWED.

Petition	Nov. 28, 1905	, 190
Affidavit	“ “ 1905	, 190
Specification	“ “ 1905	, 190
Drawing 2 shts.	“ “ 1905	, 190
Model or Specimen		, 190
First Fee Cash \$15.00	Nov. 28, 1905	, 190
“ “ Cert.		, 190
Appl. filed complete	Nov. 28, 1905	, 190

Examined—A. P. Shaw Ex. July 10, 1906 , 190

Countersigned—W. W. Mortimer , 190

7-12-1906 For Commissioner. For Commissioner.

Notice of Allowance—July 12, , 1906 , 190

Cert.

Final Fee Cash Dated June 13 , 1906 , 190

“ “ Cert. \$20. June 18 , 1906 , 190

Patented July 31 , 1906

2 Associate Attorney

Attorney—James R. Townsend,

430 Bradbury Bldg.

Los Angeles, Cal.

Name Serial Number

Patent No. Date of Patent

36 *Wilson & Willard Manufacturing Company*

James R. Townsend,
Townsend Bros., Patent Attorneys,
430-433 Bradbury Building,
Los Angeles, Cal.

\$15 RECEIVED.

Ck.

NOV. 28, 1905. S.

CHIEF CLERK U. S. PATENT OFFICE.

289, 380 Paper No. 1½

MAILED

NOV. 22, 1905.

James R. Townsend.

Elihu C. Wilson.

Underreamer.

Los Angeles, Cal.

HON. COMMISSIONER OF PATENTS:

Sir: We herewith hand you Petition and Power of Attorney, Specification, Oath and two sheets of Drawings, in the matter of the above-entitled application for U. S. Patent.

Also enclosed find our check for \$15.00, in payment of filing fee thereon.

Kindly file, acknowledge receipt, and oblige,

Yours respectfully,

JAMES R. TOWNSEND.

Adam.

MAIL ROOM.

NOV. 28, 1905.

U. S. PATENT OFFICE.

Townsend Bros.

REGISTERED ATTORNEYS

No. 370.

IN THE UNITED STATES PATENT OFFICE.

James R. Townsend, Francis M. Townsend
430-433 BRADBURY BLOCK, Los Angeles,
California.

PETITION AND POWER OF ATTORNEY,
TO THE HON. COMMISSIONER OF PATENTS.

Your petitioner Elihu C. Wilson whose Post Office address is Bakersfield, Kern County, California, a citizen of the United States residing at Bakersfield in the county of Kern and State of California, prays that letters patent may be granted to him for the ~~improvement in~~ Underreamer set forth in the annexed specification, and he hereby appoints ~~the~~ ~~firm of~~ TOWNSEND BROS., the individual members of which firm are James R. Townsend and Francis M. Townsend of Los Angeles, California his attorney with full power of substitution and revocation to prosecute this application to make alterations and amendments therein, to receive the patent and to transact all business in the PATENT OFFICE connected therewith.

ELIHU C. WILSON.

SPECIFICATION:

To All Whom it May Concern:

Be it known that I, Elihu C. Wilson, a citizen of the United States, residing at Bakersfield, in the County of Kern, and State of California, have invented a new and useful UNDERREAMER, of which the following is a specification.

Objects of this invention are to provide an under-reamer of superior strength and of superior width and expansion of cutters so as to enable reaming as great a portion of the circumference of the hole as possible at each stroke; to ensure greater safety against losing the cutters from the body while reaming; to avoid the necessity of a middle joint in the

Insert E¹ mandrel or reamer body. ^Λ
E¹

By this invention it is possible to increase the strength of the cross or tee which suspends the cutters. In this invention a cross or tee formed of a single forging is provided for suspending the cutters.

Another decided advantage is simplicity and convenience of attaching and removing the cutters and suspending devices from the reamer body.

Another advantage is facility of collapsing the cutters. I so construct the mouth of the under-reamer as to dispense with stock between the collapsed cutters, thus enabling the cutters to close together. This feature makes extreme expansion possible, and makes the use of maximum amount of stock in shanks of cutters possible, thus insuring maximum strength of cutters.

The accompanying drawings illustrate the invention:

Figure 1 is a view of the underreamer in a casing just before it has passed through the shoe of the casing, the parts being collapsed.

Fig. 2 is a view looking at the bottom of Fig. 1.

Fig. 3 is a view of this newly-invented underreamer in a well, the same having just passed through the casing shoe, and expanded for reaming the hole below; portions shown in mid-section.

Fig. 4 is a view looking at the bottom of Fig. 3.

Fig. 5 is a view of the reamer body at right angles to Figs. 1 and 2.

Fig. 6 is a view looking at the bottom of Fig. 5.

Fig. 7 is a front view of a cutter detached.

Fig. 8 is an edge view of a cutter at right angles to Fig 7.

Fig. 9 is a view of the inside or back of the cutter.

Fig. 10 is a view looking down on the top of the cutter.

Fig. 11 is a view of the cross.

Fig. 12 is a view of the cross at right angles to Fig. 11.

Fig. 13 is a side view of the spring seat block detached.

Fig. 14 is a bottom view of the same.

1 designates a hollow body of an underreamer terminating in Λ forks 2 which terminate in down-
B¹

Insert B¹ to spread the cutters apart

per B wardly projecting lugs, 2' Λ 3 designates ways
 formed by the forks. 4 designates the cutters which
 are

Λ interchangeable; 4¹, the cutter shank; 4², bearing shoulders of the cutters to engage inside the ways

40 *Wilson & Willard Manufacturing Company*

per B on the sides of said cutters
 3; 4³, expansion bearing faces of the cutters, Λ
 Insert D¹ 5 is a cross; 5' the stem of the cross, and 6 the
 spring which actuates the cross. The parts 5, 5',
 constitute spring-actuated means for actuating the
 cutters to expand the same.

7 is a block forming a seat for the spring 6. One
 or more dowel pins 8 may be provided as means for
 holding the block or spring seat 7 in place. 9 design-
 Insert D² for holding the cutters 4 apart
 nates the spreading-bearings Λ , and 10 the down-
 thrust bearings for the cutters. 11 is a detachable
 cross-piece in the form of a bolt secured by a nut 12.
 13 is an angular socket in the outer face of one of the
 forks around the bolt-hole 14 in said fork. The nut
 12 is conformed to the angular socket, and the bolt 11
 is provided with an angular socket 15 in its head
 to receive a wrench, not shown, for screwing the
 bolt into the nut.

The expansion bearing faces 4³ terminate at their
 per B or bearings
 upper ends in rounded corners Λ 16 to ride more
 readily over the beveled end faces 17 of the down-
 per B to engage said bearings
 wardly-projecting lugs 2' Λ , for expanding the cut-
 ters. 18 designates recesses in the inner faces of the
 cutters for engaging the ends of the cross 5.

19 and 20 indicate the usual tension nut for the
 spring 6 and the cotter-pin for securing the same.

To assemble the underreamer, the block 7
 will first be placed on the stem 5' of the cross
 5, and the spring 6 is then adjusted and se-
 cured in place by the nut 19 and cotter-pin 20.
 Then the cutters are placed on the ends re-

spectively of the cross 5 which seat in the recesses 18 therefor. Then the parts thus assembled are inserted into the hollow mandrel and brought into the position shown in Fig. 3, whereupon the dowel pins 8 are inserted and the cross-piece formed of the bolt 11 is then inserted; the nut 12 is placed in its angular socket 13, and the bolt or cross-piece 11 is then screwed home. The underreamer is then in condition for operation.

To use the underreamer, the cutters will be drawn down below the downwardly-projecting lugs 2', thus collapsing the same into the position shown in Fig. 1, whereupon the underreamer will be inserted into the pipe or casing in the usual manner and allowed to descend. When it has passed through the shoe, as shown in Fig. 3, the spring operates in the usual manner to draw the cross 5 up, thus bringing the cutters into the expanded position shown in Fig 3. The rounded shoulders 16 ride readily over the beveled faces 17, and the upper ends of the cutter stems seat against the down-thrust bearings 10, and the bearing shoulders 4² of the cutters engage the ways 3 of the fork prongs or members 2, thereby being solidly held during the operation of underreaming. The spreading bearings 9 of the lugs 2' engage the expansion bearing faces 4³ of the cutters at the same time so that the tool is practically a unit during the operation of underreaming.

30 designates the usual shoulders on the cutters for drawing the same in when the tool is removed through the pipe or casing 40.

It is advisable that the lower ends of the forks 2

should not form down-thrust bearings for the cutters as there would otherwise be a tendency of crystallization of said forks, which is avoided by making the down-thrust bearings at 10 only.

The cross-piece 11 serves as a brace for the prongs of the fork, and prevents accidental removal of the cutters and tee or cross 5.

Insert
D3

What I claim is:—

body

per B

1. An underreamer Λ having projecting lugs at its mouth for expanding the cutters

body

per B

2. An underreamer Λ provided with upper and lower bearings for its expanded cutters, the lower bearing being formed of lugs projecting at the mouth of the reamer.

body

Sub D4

Sub D4

3. An underreamer Λ having cutter bearings for the down-thrust and bearings for expanding the cutters, the latter being formed of projecting lugs at the mouth of the reamer.

4. An underreamer ~~having a~~ body terminating prongs forming said prongs having shoulders on their inner faces in Λ a fork Λ to form ways for the cutters.

Sub D4

Sub D4

5. A hollow underreamer body terminating in prongs forming having shoulders on the inner faces to form Λ a fork ~~forming~~ Λ ways for the cutters, cutters in said ways, a cross in said hollow body for operating said cutters, a spring for operating the cross, a block in the body to form a seat for said spring, and one or more dowel pins securing the block in place.

Sub D4

Sub D4

6. A hollow underreamer body, cutters, a cross inside the hollow body for operating said cutters, a

spring for operating said cross, a block in said body forming a seat for said spring, and one or more dowel pins for holding the block in place Λ
 B^2

Insert B²

7. A hollow underreamer body provided with cutter ways and bearings, cutters in said ways and engaging said bearings, spring-actuated means for actuating said cutters, and a block secured in said hollow body and extending below said bearings to hold the upper ends of the said cutters apart.

per B

terminating in prongs forming a fork and

7. 8. A hollow underreamer body Λ provided with ways and down-thrust bearings for cutters, cutters in said ways engaging said bearings, a cross for operating said cutters, a spring for actuating said cross, a block forming a guide for the stem of the cross and a seat for the cross-actuating spring, Λ projecting
 B^3

per B

Insert B³

below the down-thrust bearings to hold the upper ends of the cutters apart, and means for holding the block in the reamer body.

8 9. A hollow underreamer body terminating in Λ a fork, cutters ~~held by~~ Λ said ~~fork~~, Λ means for
 B^4

er B

er B

Insert

4

operating the cutters, and a detachable cross-piece connecting the ends of the fork.

9 10. An underreamer body terminating in Λ a fork Λ which forms cutter ways and terminates in
 B^5

er B

Insert B⁵

er D

er B

downwardly-projecting lugs, and cutters mounted between the prongs of said fork and having should-

44 *Wilson & Willard Manufacturing Company*

ers inside the fork and faces to bear on the projecting lugs.

per D
sub E2

10 ~~11~~. An underreamer having lugs at the sides of the
Λ lower end of its body to hold the cutters apart.

12. An underreamer body terminating in a fork and a cross-piece forming a brace for the prongs of the fork.

13. An underreamer body terminating in a fork, cutters and means for suspending the same in said body, and a cross-piece extending between the prongs below the suspending means.

per
B

14. An underreamer body having down-thrust bearings and forks below said bearings, cutters held by said forks and provided with shoulders to engage the down-thrust bearings, and means for holding the cutters expanded in position with their shoulders in engagement with said down-thrust bearings.

per B

11 ~~15~~. An underreamer body terminating in a fork having beveled faces at the ends of its prongs, cutters having shoulders to ride over said beveled faces, and means for suspending said cutters in said body.

Insert A1

— IN TESTIMONY WHEREOF, I have hereunto
Bakersfield
set my hand at Los Angeles, California, this 20th day
of November, 1905.

ELIHU C. WILSON.

In presence of:

H. I. TUPMAN.

T. E. KLOPSTEIN.

OATH.

STATE OF CALIFORNIA,

KERN

COUNTY OF ~~LOS ANGELES~~,—ss.

Elihu C. Wilson, the above-named petitioner, being duly sworn, deposes and says that he verily believes himself to be the original, first and sole inventor or discoverer of the ~~improvement in~~ Underreamer described and claimed in the annexed specification; that he does not know and does not believe that the same was ever known or used before his invention or discovery thereof; or patented or described in any printed publication in any country before his invention or discovery thereof, or more than two years prior to this application; or in public use or on sale in the United States for more than two years prior to this application, and that no application, for patent on said improvement has been filed by him or his legal representatives or assigns, in any foreign country, ~~except~~ as follows:

And said ——— states that he is a citizen of the United States and resident of ——— in the County of Los Angeles, and State of California.

And said Elihu C. Wilson states that he is a citizen of the United States and resident of Bakersfield in the County of Kern and State of California.

ELIHU C. WILSON.

Subscribed and sworn to before me this 20th day of November, 1905.

[Seal]

H. I. TUPMAN,

Notary Public, in and for the County of Kern, State of California.

46 *Wilson & Willard Manufacturing Company*

MAIL ROOM.

DEC. 26, 1905.

U. S. PATENT OFFICE.

U. S. Patent Office,

DEC. 27, 1905.

DIVISION 38.

289380 Paper No. 1.

Amdt. A.

IN THE UNITED STATES PATENT OFFICE.

Division 38,

Room No.

Paper No. 1.

MAILED

Elihu C. Wilson,

Underreamer,

Filed Nov. 28, 1905.

Ser. No. 289,380.

TO PATENT OFFICE

DEC. 19, 1905.

James R. Townsend.

Los Angeles, Cal., Dec. 19, 1905.

Hon. Commissioner of Patents,

Sir:—Upon further consultation with the applicant before receiving action from your Office, please add the following claim in the above mentioned application for patent; namely:—

18 ~~16~~. An underreamer having a body terminating in a fork, and cutters suspended between the prongs of the fork, the ends of said prongs being constructed and arranged to wedge between adapted to spread Δ the cutters apart. —

Very respectfully,

JAMES R. TOWNSEND,

Atty. for Wilson.

Approved:

E. C. WILSON.

sub D^s

A¹

per C

per C

Insert
B^s

L. C.

Paper No. 1.

All communications respecting this application should give the serial number, date of filing, and title of invention.

Div. 38, Room 378.

Address only

“The Commissioner of Patents, Washington, D. C.”

DEPARTMENT OF THE INTERIOR
UNITED STATES PATENT OFFICE

WASHINGTON, D. C., January 9, 1906.

MAILED “ “ “

Elihu C. Wilson,

Care James R. Townsend,

#430 Bradbury Bldg.,

Los Angeles, Cal.

Please find below a communication from the Examiner in charge of your application. for “Underreamer,” filed November 25, 1905, Serial No. 289,380.

F. I. ALLEN,

Commissioner of Patents.

The shape of the ways 3 should be illustrated showing how the guides 42 operate.

Claim 1 is rejected on—

Swan, 683,352, Sept. 24, 1901, Artesian & Oil Wells,
Reamers.

Claims 2 to 6, inclusive, are rejected on—

Double, 748,054, Dec. 23, 1903, (Same Class).

There is considered to be no invention in substituting dowel-pins for screw-threads to hold in the block, as they are both within the knowledge of an

48 *Wilson & Willard Manufacturing Company*

ordinary mechanic.

Claims 7 to 14, inclusive, are rejected on—

Double, 796,197, Aug. 1, 1905, (Same Class).

Claim 16 is objected to as it differs from the patents to Double, cited, only in statements of function.

Claim 15 is allowed.

A. P. SHAW, Ex.

MEP.

U. S. Patent Office.

MAIL ROOM

289,380. Paper No 4.

MAR. 14, 1906.

DIVISION 38.

MAR. 12, 1906.

Amdt. B.

U. S. PATENT OFFICE.

MAILED

TO PATENT OFFICE

MAR. 6, 1906.

Elihu C. Wilson,

Div. 38

Underreamer,

Room 378.

Filed Nov. 25, 1905,

Paper #2.

Ser. No. 289,380.

James R. Townsend.

Los Angeles, Cal., March 5, 1906.

Hon. Commissioner of Patents,

Sir:—Office letter of January 9, 1906, and the patents referred to have been considered.

Page 2, last line, cancel “forks 2 which” and sub-

stitute—prongs 2 forming a fork; said prongs having shoulders 2” on their inner faces to form ways 3 for cutters. Said prongs are provided with and—

Before the period insert—to spread the cutters apart.— The clause as amended will read as follows:—1 designates a hollow body of an underreamer

terminating in prongs 2 forming a fork; said prongs having shoulders 2" on their inner faces to form ways 3 for cutters. Said prongs are provided with and terminate in downwardly-projecting lugs 2' to spread the cutters apart.—

Page 3, line 1, cancel "3 designates ways formed by the forks." Line 4, change the period to a comma and add—on the sides of said cutters.—Line 20, after "corners" insert—or bearings—; line 21, before "for" insert—to engage said bearings—.

Claims 1 and 2, line 1, after "underreamer" insert—body—. It is requested that claims 1 and 2 be reconsidered and allowed for the reason that the patents do not show any lugs at the mouth of the underreamer body for expanding the cutters. The term "lugs" can only be applied to projecting parts, and no parts are shown in the patents which come within the definition of the term "lugs."

Claim 3, line 1, after "underreamer" insert—body—; line 3, before "projecting" insert—downwardly—; after "reamer" insert—body—.

Reconsideration and allowance of this claim is requested in view of the foregoing.

Claim 4, line 1, cancel "having a"; after "in" insert—prongs forming—; line 2, after "fork" insert—, said prongs having shoulders on their inner

faces—. The claim as amended reads:

—4. An underreamer body terminating in prongs forming a fork, said prongs having shoulders on their inner faces to form ways for the cutters.

Claim 5, line 1, after “in” insert—prongs forming—; line 2, for “forming” substitute—having shoulders on the inner faces to form—.

Claim 6, before the period insert—, said block and pins being located entirely above the head of the cross.—

B²

Cancel claim 7.

Claim 8 renumber as 7. Line 1, after “body” insert—terminating in prongs forming a fork and—; line 6, after “spring” insert—its lower end terminating above the head of the cross—.

B³

Claim 9 renumber as 8. Line 1, after “in” insert—prongs forming—; before line 2 insert—said prongs having shoulders on their inner faces to form ways,—; line 2, substitute—in—for “held by”; substitute—ways—for “fork.” The claim as amended reads:

B⁴

—8. A hollow underreamer body terminating in prongs forming a fork, said prongs having shoulders on their inner faces to form ways, cutters in said ways, means for operating the cutters, and a detach-

able cross-piece connecting the ends of the fork.—

Claim 10 renumber as 9. Line 1, after “in” insert—prongs forming—; after “fork” insert—and provided with shoulders on the inner faces of the prongs—; line 2, change “forms” to—form—.

Claim 11 renumber as 10. Reconsideration and allowance of this claim is requested in view of the fact that none of the patents show the lugs called for in this claim, it being understood that the term “lugs” is limited to projecting devices, none of which for this purpose is shown in the patents.

Cancel claims ~~11~~, 12, 13, 14.

Claim 15 renumber as 11. Line 1, after “in” insert—prongs forming—.

Add the following claims:

—12. An underreamer body terminating in prongs forming a fork, the ends of said prongs being provided with lugs to spread the cutters apart.

13. An underreamer body terminating in prongs forming a fork, said prongs having shoulders on the inner faces to form ways for the cutters, and said prongs terminating in lugs to act as spreaders for the cutters.

14. A hollow underreamer body terminating in prongs forming a fork, said prongs terminating in lugs for spreading the cutters, said lugs having beveled ends to engage bearings on cutters to expand cutters.

15. An underreamer body terminating in prongs

forming a fork, said prongs terminating in lugs or projections, said lugs having beveled faces or bearings to expand the cutters, and also faces or bearings for the cutters to rest on after they have expanded to a normal position for reaming.

16. ~~An underreamer cutter having shoulders or projections on its sides to form bearings to rest on the lugs of the underreamer body.~~

17. ~~An underreamer cutter having shoulders to bear on the lugs of the underreamer body, and having shoulders or projections on its sides to bear against the shoulders on the inner faces of prongs of underreamer body when cutters are expanded to normal position for reaming.—~~

It is believed that the foregoing is in accordance with the views of the Examiner as expressed in a private interview with the inventor, and the application will now be found in condition for issue.

Favorable consideration is therefore requested.

Very respectfully,

JAMES R. TOWNSEND,

Attorney for Wilson.

L. C.

Paper No. 4.

All communications respecting this application should give the serial number, date of filing, and title of invention.

Div. 38, Room 378.

Address only "The Commissioner of Patents,
Washington, D. C."

DEPARTMENT OF THE INTERIOR.

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C., March 21, 1906.

MAILED " " "

Elihu C. Wilson,

Care J. R. Townsend,

Bradbury Building,

Los Angeles, Cal.

Please find below a communication from the Examiner in charge of your application, for "Underreamer," filed November 28, 1905, Serial No. 289,380.

F. I. ALLEN,

Commissioner of Patents.

In response to the communication filed March 12, 1906:

Claims 1 to 4, inclusive, are rejected on Double, 748,054, of record, which shows shoulders on the inner faces for guiding the cutters.

Claim 5 is rejected on Double, 748,054, in view of Double, 796,197, of record. The use of dowel pins for the bolt of Double or the screw-threads shown in—

Swan, 717,469, Dec. 30, 1902, (Same Class);
is not considered patentable.

54 *Wilson & Willard Manufacturing Company*

Claim 8 is rejected on Double, 748,054 in view of Double, 796,197, of record, showing a cross-piece at the end of the forks.

Claim 9 is objected to as it is not clear to what "which" in line 2 refers. If "forms" is changed "terminates" should also be changed.

Claim 10 is rejected on Double, 748,054, of record, as not distinguishing therefrom.

Claims 16 and 17 are rejected on Double, 748,054, of record. Furthermore, the article of Manufacture cannot be limited by the device with which it is used.

Original claim 16 has not been amended and the objection made in the last Office letter is repeated.

Attention is called to the fact that claims 11, 12, 13, and 14, are directed to be canceled. In view of other portions of the amendment only original claims 12, 13, and 14, have been canceled.

Claims 6, 7, 11, 12, 13, 14 and 15, are allowed.

M.E.P.

A. P. SHAW Ex.

289,380 Paper No. 5.

Amdt. C.

U. S. Patent Office.

MAIL ROOM. MAR. 28, 1906.

MAR. 27, 1906. DIVISION 38.

U. S. PATENT OFFICE.

MAILED
TO PATENT OFFICE
MAR. 21, 1906.

James R. Townsend.

Div 38.

Room 378.

Paper #3.

IN THE UNITED STATES PATENT OFFICE.

Elihu C. Wilson,
Underreamer,
Filed Nov. 25, 1905,
Serial No. 289,380.

Los Angeles, Cal., March 12, 1906.

Hon. Commissioner of Patents,

Sir: It is noted in my amendment dated at Los Angeles, March 5, 1906, page 3, line 9 should read:
—Cancel claims 12, 13 and 14—, therefore please
correct said line to read accordingly.

Claim 16 was overlooked in said amendment there-
fore renumber said claim 16 to be 18.

I amend said claim as follows: Line 3 of the claim
change “adapted to spread” to—constructed and
arranged to wedge between—. Last line, cancel
“apart.” This claim now clearly sets forth the ar-
rangement of the prongs with relation to the cutters
and no reason is seen why it may not be allowed.

Respectfully submitted,

JAMES R. TOWNSEND,
Attorney for Wilson.

AHM-M-
A. H. MERRILL.

L. C.

Paper No. 6.

All communications respecting this application should give the serial number, date of filing, and title of invention.

Div. 38, Room 378.

Address only

"The Commissioner of Patents,
Washington, D. C."

DEPARTMENT OF THE INTERIOR
UNITED STATES PATENT OFFICE.

WASHINGTON, D. C., April 3, 1906.

MAILED " " "

Elihu C. Wilson,
Care J. R. Townsend,
Bradbury Bldg.,
Los Angeles, Cal.

Please find below a communication from the EX-AMINER in charge of your application.
for "Underreamer", filed November 28, 1905, Serial
No. 289,380.

F. I. ALLEN,
Commissioner of Patents.

In response to the communication filed March 27,
1906:

Claims 12, 13, and 14, were canceled in view of the amendment of March 12, 1906.

Claim 18 as amended is objected to as being indefinite on account of the phrase "constructed and arranged." Such a phrase does not define any structure.

M.E.P.

A. P. SHAW, Ex.

U. S. Patent Office.

MAIL ROOM 289,380, Paper No. 7.

APR. 17, 1906.

APR. 16, 1906. Amdt. D.

DIVISION 38.

U. S. PATENT OFFICE.

MAILED

TO PATENT OFFICE

APR. 10, 1906.

James R. Townsend.

Div. 38

Room 378

Paper No. 6.

IN THE UNITED STATES PATENT OFFICE.

Elihu C. Wilson,

Underreamer,

Filed Nov. 28, 1905,

Ser. No. 289,380.

Los Angeles, Cal., April 9, 1906.

Hon. Commissioner of Patents,

Sir: Office letter of March 21, 1906, and the patents referred to have been considered. Amend the specification as follows:—

Page 3, after line 4 insert:

The inner faces of the prongs 2 are parallel, and the sides or shoulders 2'' which form the ways 3 are also parallel; the cutter-shank 4' and its bearing

4²

shoulder \wedge 4'' are straight; that is to say, the sides or edges thereof are parallel and fit the ways 3.—

After line 12, Page 3, insert:

D^a The down-thrust bearings 10' are in the nature of shoulders formed by the edges of the forks at the base of the lugs 2'. The prongs 2 of the body are of substantially one thickness throughout, excepting that they are reduced at their lower ends to form lugs for spreading the cutters 4 apart. The edges of the lugs 2' form the spreading bearings 9, and the prongs terminate abruptly in the shoulders 10' at the base of the lugs 2". This construction affords the necessary operative structure with maximum strength for minimum weight of body.

At the end of page 5 add:

D^a It is to be noted that by the construction shown the cutters are quickly expanded at the initial upward movement of the same after escaping the shoe of the casing 40; and that immediately thereafter the cutters are solidly held in the straight and parallel ways 3, and that when the cutters are fully drawn up they seat on the down-thrust bearings 10 and the spreading bearings 9, while the shanks are rigidly held throughout their length. Said spreading bearings are on the lugs 2' which constitute wedges for wedging the cutters apart, and said bearings are at the sides of the lower ends of the body, thus engaging the outer edges of the cutters to hold the cutters apart, and leaving an open space between the middle portions of the cutters for a greater distance upward from the lower ends of the cutters than would be the case were the cutters held apart by any intermediate portion between the lugs.

I term the cutters "shouldered cutters" for the reason that the rounded corners 16 which extend away from the shank at right angles thereto are in the nature of shoulders, the inner faces 4³, of which engage the spreading faces 9 of the side lugs 2' to brace the cutters and hold them apart.

Rewrite claims 1, 2 and 3 to read as follows:—

1. An underreamer body terminating in prongs having projecting *lugs* at their lower ends with spreading bearings 9 for holding the cutters apart.

2. An underreamer body terminating in prongs and provided with upper and lower bearings for its

^{the}
~~expanded~~ ^Λ cutters, said prongs having projecting *lugs*, the edges of which form lower bearings for holding the cutters apart, and the ends of said lugs having beveled end faces.

3. An underreamer body terminating in prongs the inner faces of which are provided with straight parallel ways, ~~the cutters having straight shanks fitting said ways~~, the ends of said prongs terminating in *lugs* below said ways to spread and hold the cutters apart.

I request reconsideration and allowance of claim 4 for the reason that Double 748,054 does not show a cutter body terminating in prongs forming a fork. Upon the contrary, the Double body is provided with a web 6 on each side of which are recesses 4 and 5, there being a slot 7 through the *web*. The Double underreamer body in #748,054 clearly does not anticipate claim 4 which is limited to the body termi-

nating in prongs forming a fork.

It is thought that the rejection of claim 4 on this reference was an inadvertency, as the applicant advises the writer as follows:

“You can remind the Examiner, that he and I investigated that particular point very carefully, while I was in Washington, and we discovered that no patent had ever been issued, covering on forked mouth reamers with shoulders on their inner faces. He stated without hesitation, that I was entitled to that claim. The Double patent certainly does not cover on the reamer terminating in prongs forming a fork. He apparently quite overlooks the difference in the construction of the two reamers. I will ask you to again request an allowance of that claim.”

In view of the foregoing I request reconsideration and allowance of claim 5. The downwardly-extending *lugs*, 3, 3' in the Double patent #796,197 do not suggest the prongs *having shoulders* on the inner faces to form ways for the cutters, and since Double #748,054 does not suggest any forked structure, and Double does not in fact in either patent show the structure claimed in the first two lines of claim 5; nor are the dowel pins or the rest of the claimed combination found in any of the patents in the relation stated, it is thought this claim, upon reconsideration, will be allowed.

Please reconsider and allow claim 8 in view of the foregoing. Double #748,054, as above stated, does not show a fork, and Double #796,197, issued long after, does not show any shoulders on the inner

faces to form the ways. It is believed that the Examiner will see his way to allow this claim.

Claim 9, line 2, change "terminates" to—terminate—.

Claim 10, line 1, before "lower" insert—sides of the—.

Cancel claims 16 and 17 and substitute therefor:

16. An underreamer cutter having two shoulders and a bearing face on the inner side of each of the two shoulders of the cutter.

17. An underreamer cutter having a shank and a shoulder on either side of the shank of the cutter, each of said shoulders projecting at right angles to the shank of the cutter and having a bearing face on its inner side.

Rewrite claim 18 to read as follows:—

18. An underreamer having a body terminating in a fork, and cutters suspended between the prongs of the fork, the ends of said prongs constituting wedges to wedge between the cutters.

It is believed that the foregoing avoids all objection and places the case in condition for issue.

The final fee is herewith transmitted and it is requested that the patent issue as early as possible.

Very respectfully,

JAMES R. TOWNSEND,

JRT—J.

Attorney for Wilson.

MAILED
TO PATENT OFFICE

APR. 10, 1906.

ACCOUNT 289,380, Paper No. 8.
MAIL ROOM Amdt. (drg.)
APR. 16, 1906, James R. Townsend.
U. S. PATENT OFFICE.

IN THE UNITED STATES PATENT OFFICE.

E. C. Wilson, Div. 38
Underreamer, Room 378
Filed Nov. 28, 1905, Paper #5.
Ser. No. 289,380.

Los Angeles, Cal., April 9, 1906.

Hon. Commissioner of Patents,

Sir: The application has been considered in view of Office letter dated March 21, 1906.

Additional reference characters appear to be required on the drawing. Please add to the drawing the character 2".

In Figure 5 apply said character immediately below the character 3 and connect it with the solid lines at the left and right.

In Fig. 6 apply the character 2" inside the circle and connect the same by leaders with the lower faces of the two triangles which are above said circle and the upper faces of the two triangles which are below said circle.

In Figs. 1, 5, and 6, apply the characters 10', and connect the same by leaders with the shoulders at the base or upper end of the lugs 2"; said shoulders being represented by the four triangles in Fig. 6, by

the two shoulders in Fig. 1, and by the two shoulders in Fig. 5.

If any expense attaches charge my account for the same.

Very respectfully,

JAMES R. TOWNSEND,

JRT—J.

Atty. for Wilson.

Townsend J. R. C. U. S. Patent Office. Number 81548. Received Apr. 16, 1906. Chief Clerk. Apr. 16, 1906. Corrected and forwarded 4/30/06. No. Chg. Forward to mail room for Div. 38. Mail Room, May 1, 1906. Transfer to Div. 38. U. S. Patent Office. May 1, 1906. Division 38.

L. C.

Paper No. 9.

All communications respecting this application should give the serial number, date of filing, and title of invention.

Div. 38, Room 378.

Address only

“The Commissioner of Patents,
Washington, D. C.”

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

WASHINGTON, D. C., May 4, 1906.

MAILED “ “ “

Elihu C. Wilson,

Care James R. Townsend,

Bradbury Bldg.,

Los Angeles, Cal.

Please find below a communication from the EX-

AMINER in charge of your application, for "Underreamer," filed November 28, 1905, Serial No. 289,380.

F. I. ALLEN,
Commissioner of Patents.

In response to the communication filed April 16, 1906:

In line 3 of the amendment to page 3, line 4, "4" should be 4².

Claims 2 and 3 are objected to on account of the reference to the cutters. The introductory phrase of both claims sets forth that the combination is for an underreamer body, and as such the cutters form no part of said body.

It is suggested that in claim 2, line 2, "its expanded" be changed to *the*.

Claim 3, line 3, "the cutters having straight shanks fitting said ways" should be canceled.

Claim 10 is rejected on Double, 748,054, of record.

The Examiner is unable to see wherein claims 16 and 17 distinguished from Double, 748,054, of record, and said claims are accordingly rejected.

Claims 1, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, and 18, are allowed.

A. P. SHAW, Ex.

MEP

U. S. Patent Office.

289,380, Paper No. 10.

MAY 12, 1906.

Amdt. E.

DIVISION 38.

IN THE UNITED STATES PATENT OFFICE.

Div. 38,

Room 378,

Elihu C. Wilson,

Paper #10.

Under-reamer,

Filed Nov. 28, 1905,

Ser. No. 289,380.

Washington, D. C., May 12, 1906.

Hon. Commissioner of Patents,

Sir: Office letter of May 4, 1906 has been considered.

It is noted that the leader from the character 4³ in Fig. 9 of the drawings is too long. Please remove the end thereof so that the leader will terminate at the right of a vertical drawn from the right edge of the shank 4'.

Please add the character 4³ to the left of Fig. 9 and connect the same by a leader to indicate on the left of the view the bearing corresponding to the one indicated by the character 4³ at the right of the view.

In Fig. 4 apply the character 4³ in at least two places above and below the view and connect said character by a leader to indicate the bearings at the edges of the cutters 4.

Apply the character 4 to indicate the cutter at the left of Fig. 4.

In the specification:

Page 1, line 11, before the period insert:

E¹

—and to leave a maximum open space between the cutters to receive the loose material or sludge, at the bottom of the well or other opening during the operation of drilling.

Claim 2, line 2, change “its expanded” to—the—.

Claim 3, line 3, cancel “the cutters having straight shanks fitting said ways”.

Rewrite claim 10 to read as follows:

E²

10. An under-reamer body terminating in prongs having projecting lugs at their lower ends to hold the cutters apart.

Add the following claims:

E³

19. An under-reamer comprising a body terminating in two prongs, and cutters each having two shoulders and a bearing face on the inner side of each of the two shoulders to engage said prongs.

20. An under-reamer comprising a body terminating in prongs the inner faces of which are provided with straight parallel ways, and cutters having straight shanks fitting said ways, the ends of said prongs terminating in lugs below said ways to spread and hold the cutters apart.

It is believed that in view of the application of the additional characters to Figs. 9 and 4, the Examiner will be able to pass claims 16 and 17. The Double cutter has its bearing face entirely across the cutter instead of on the inner side of the shoulders

at the sides of the shank as specified in these claims.

It is believed that the foregoing places the case in condition for issue.

The final fee has been paid. Please issue the patent at once.

Very respectfully,

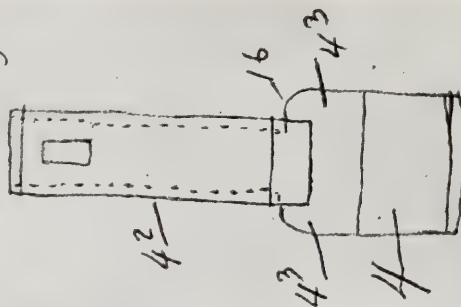
JAMES R. TOWNSEND,

Atty. for Wilson.

289,380

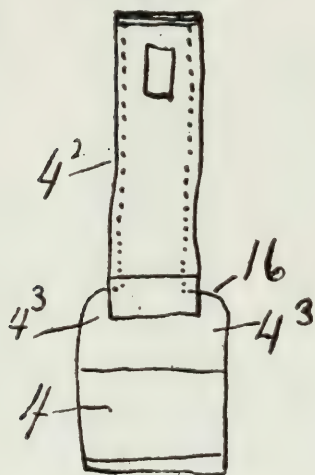
Paper No. 11

*Andt (arg)
fig 9*



U. S. Patent Off.
MAY 12 1911
DIVISION 38.

Fig. 9.



70 *Wilson & Willard Manufacturing Company*

IN THE UNITED STATES PATENT OFFICE.

Elihu C. Wilson,

Div. 38,

Under-reamer,

Room 378,

Filed Nov. 28, 1905,

Paper 10.

Ser. No. 289,380.

Washington, D. C. May 12, 1906.

Hon. Commissioner of Patents,

Sir: Please amend Fig. 9 of the drawings as indicated by red lines in the accompanying sketch, viz.:

In Fig. 9, add two horizontal lines; one connecting the lower ends of the edge lines of the shank, and the other connecting said edged lines to indicate the angle in the face of the shank as shown in Fig. 7.

You will please prepare and file in the case photo copies of the drawings. (full size).

Charge my account for the service.

Very respectfully,

JAMES R. TOWNSEND,

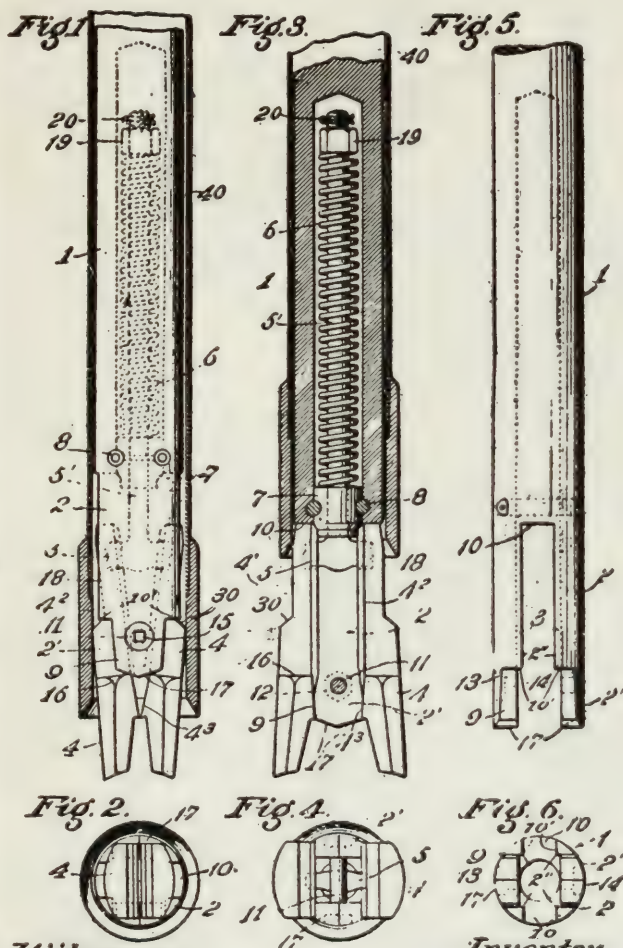
Atty. for Wilson.

Townsend. J. R. C. U. S. Patent Office. Number 101,913. Received May 14, 1906. Chief Clerk. Rec'd. in Div. C. May 15, 1906. Forwarded to mail room, for Div. E. 5/18/06. Mail Room, May 19, 1906. Transfer to Div. E. Received in Div. E. May 19, 1906. Photographs, May 25, 1906. 2 Sheet Drg. Cost, \$ 30¢. 2 Prints ~~mailed~~ filed. Book 26, page 37. T. To Mail Room for Div. C. 5/26/06. Mail Room. May 26, 1906. Transfer to Div. C. Rec'd in Div. D. May 26, 1906. Corrected and forwarded 5/29/06. No chg. Forward to mail room for Div. 38. Mail Room, May 31, 1906. Transfer to Div. 38. U. S. Patent Office. May 31, 1906. Division 38.

289,380

219
1

P



Witnesses:
E. C. Hollis
G. J. Williams

Inventor,
Elihu C. Wilson
by James R. Townsend
his atty

289,380
2

Fig. 7.

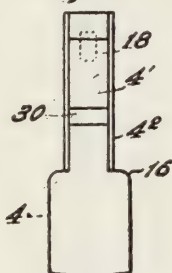


Fig. 8.

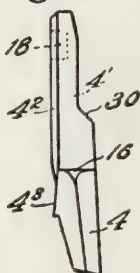


Fig. 9.

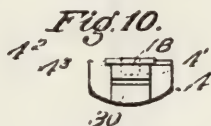
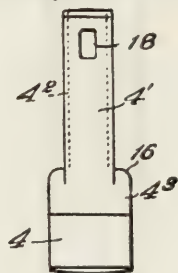


Fig. 11.



Fig. 12.



Fig. 13.



Fig. 14.



Witnesses:

C. C. Kelly
G. J. Williams

Inventor,

Elihu C. Wilson.

By James R. Townsend
his Atty

L. C.

Paper No. 12.

All communications respecting this application should give the serial number, date of filing, and title of invention.

Div. 38, Room 378.

Address only

“The Commissioner of Patents,
Washington, D. C.”

DEPARTMENT OF THE INTERIOR
UNITED STATES PATENT OFFICE.

Washington, D. C., June 7, 1906.

MAILED “ “ “

Elihu C. Wilson,
Care J. R. Townsend,
Bradbury Bldg.,
Los Angeles, Cal.

Please find below a communication from the EXAMINER in charge of your application, for “Underreamer,” filed November 28, 1905, Serial No. 289,380.

F. I. ALLEN,
Commissioner of Patents,

In response to the communication filed May 12, 1906:

Claims 1, 2, 10, 11, 12, 14, 15, 16, 17, 18, and 19, are rejected upon—

Cummings 819,042, May 1, 1906, Artesian & Oil Wells, Reamers.

The remaining claims are allowed.

M.E.P.

A. P. SHAW, Ex.

MEMORANDUM.

OF

FEE PAID AT UNITED STATES PATENT
OFFICE.

CERTIFICATE OF DEPOSIT. MAILED

\$20—RECEIVED. S. Jun. 13, 1906.

Jun. 18, 1906. James R. Townsend.

CHIEF CLERK U. S. PATENT OFFICE.

(Be careful to give correct Serial No.)

Serial No. 289,380, 191

INVENTOR:

Elihu C. Wilson.

Patent to be Issued to:

Elihu C. Wilson.

Name of Invention, as Allowed:

Underreamer.

Date of Payment:

June 13, 1906.

FEE:

\$20.00

Date of Filing:

Nov. 28, 1905.

Date of Circular of Allowance.

The Commissioner of Patents will please apply
the accompanying fee as indicated above.

JAMES R. TOWNSEND,

ADAM,

Attorney.

Send Patent to

JAMES R. TOWNSEND
PATENTS
BRADBURY BLOCK
LOS ANGELES, CAL.

JMH.

Serial No. 289,380

Address only

“The Commissioner of Patents,
Washington, D. C.”

DEPARTMENT OF THE INTERIOR
UNITED STATES PATENT OFFICE.

Washington D. C., June 18, 1906.

Elihu C. Wilson,
c/o James R. Townsend,
430 Bradbury Bldg.,
Los Angeles, Cali.

Sir:

You are informed that the final fee of TWENTY
DOLLARS has been received in your application for
Improvement in Underreamer.

~~Date of receipt.~~

Very respectfully,
F. I. ALLEN,
Commissioner of Patents.

76 *Wilson & Willard Manufacturing Company*

MAIL ROOM 289,380, Paper No. 13.
JUN. 18, 1906. Letter, Affidavit and Print.
U. S. PATENT OFFICE. MAILED
TO PATENT OFFICE.
JUN. 13, 1906.
James R. Townsend.

IN THE UNITED STATES PATENT OFFICE.

Elihu C. Wilson, Division 38
Underreamer, Room No. 378
Filed Nov. 28, 1905, Paper No. 11
Ser. No. 289,380.

Los Angeles, Cal., June 11, 1906.

Hon. Commissioner of Patents,

Sir: I herewith hand you affidavit of the above mentioned applicant, under Rule 75, of fact showing the completion of the claimed invention in the United States prior to the filing date of the patent of A. Cummings, which issued May 1, 1906, and contains no claims to the subject matter contained in this application.

This is done for the purpose of avoiding reference to said patent.

The final fee has been transmitted and I request that the patent be issued at the earliest possible date.

Very respectfully,
JAMES R. TOWNSEND,
Atty. for Wilson.

Enclosures.

T-A.

MAIL ROOM.

JUN. 18, 1906.

U. S. PATENT OFFICE.

MAILED

TO PATENT OFFICE

JUN. 13, 1906

James R. Townsend.

Elihu C. Wilson,

Underreamer.

Fld. Nov. 28, 1906.

Ser. No. 289,380.

IN THE UNITED STATES PATENT OFFICE.

State of California,

County of Kern,—ss.

ELIHU C. WILSON, first being duly sworn, deposes and says, that he is the applicant who filed an application for patent for UNDERREAMER, in the United States Patent Office, filed Nov. 28, 1905, Serial No. 289,380.

That on or about the months of January or February, 1904, he made the drawing of the invention set forth and claimed in said application for patent and that a blue print copy of the said drawing is hereto attached and marked "EXHIBIT A E. C. WILSON."

That the said drawing was made in the State of California, and that it was exhibited to the foreman and other employees of the Baker Iron Works of Los Angeles, California, and as soon as the drawing was completed, namely about the months of January or February, 1904, that he caused an underreamer to be made in accordance with said drawing, and that said underreamer was completed by the Baker Iron Works some time prior to the 29th day of March, 1904.

78 *Wilson & Willard Manufacturing Company*

Affiant further makes oath, that he does not know and does not believe that the invention has been in public use or on sale, or printed or described in any printed publication, in this or any foreign country for more than two years prior to his application, and that he never abandoned the invention.

E. C. WILSON.

Sworn and subscribed to before me, this 15th day of June, 1906, at Bakersfield, in the County of Kern, State of California.

[Seal]

H. I. TUPMAN,
Notary Public in and for the County of Kern, State
of California.

My commissioner expires Aug. 18, 1908.

MAIL ROOM

JUN 18 1906

U.S. PATENT OFFICE.

Exhibit "A"

E. C. Wilson

Underreamer

NOV 9 1912



79



L. C.

Paper No. 14.

All communications respecting this application should give the serial number, date of filing, and title of invention.

Div. 38, Room 378.

Address only

"The Commissioner of Patents,
Washington, D. C."

DEPARTMENT OF THE INTERIOR
UNITED STATES PATENT OFFICE.

WASHINGTON, D. C. June 23, 1906.

MAILED " " "

Elihu C. Wilson,
c/o J. R. Townsend,
Bradbury Block,
Los Angeles, Cal.

Please find below a communication from the EXAMINER in charge of your application, for "Underreamer," filed November 28, 1905, Serial No. 289,380.

F. I. ALLEN,
Commissioner of Patents.

In response to the communication filed June 18, 1906:

In line 3 of the amendment to line 4, page 3, 4" should be 4² to agree with the drawing, as required in office letter of May 4, 1906.

The claims are allowed.

MEP.

G. R. IDE,
Actg. Exr.

82 *Wilson & Willard Manufacturing Company*

MAIL ROOM. 289,380, Paper No. 15.
JUL. 3, 1906. Amdt. F.
U. S. PATENT OFFICE U. S. Patent Office.
JUL. 5, 1906.
DIVISION 38.

IN THE UNITED STATES PATENT OFFICE.

MAILED
TO PATENT OFFICE
JUN. 28, 1906.
Division 38.
Room No. 378.
Paper No. 15.

Elihu C. Wilson,
Underreamer, James R. Townsend.
Filed Nov. 28, 1905,
Ser. No. 289,380.

Los Angeles, Cal., June 28, 1906.

Hon. Commissioner of Patents,

Sir: In response to Office letter of June 23, 1906.

Please substitute—4²—for “4” in line 3 of
amendment to line 4 Page 3.

The final fee has been paid. Please issue the
patent as soon as possible.

Very respectfully,
JAMES R. TOWNSEND,
Attorney for Wilson.

DOCKET Clerk. Jul. 3, 1906. U. S. PATENT
OFFICE.

A. R.

289,380

ISSUE DIVISION.

All communications should be addressed to

“The Commissioner of Patents,
Washington, D. C.”

DEPARTMENT OF THE INTERIOR
UNITED STATES PATENT OFFICE.

Washington, D. C., July 12, 1906, 190—

Elihu C. Wilson,

c/o J. R. Townsend,

430 Bradbury Bldg.,

Los Angeles, Cal.

Sir: Your APPLICATION for a patent for an
IMPROVEMENT

Under Reamers

filed Nov. 28, 1905, 190—, has been examined and allowed.

The final fee, TWENTY DOLLARS, having been received, the Letters Patent will be forwarded in due order of business.

Additional copies of Specifications and Drawings will be charged for at the following rates: Single copies, uncertified, 5 cents each. The money should accompany the order.

Very respectfully,

F. I. ALLEN,

Commissioner of Patents.

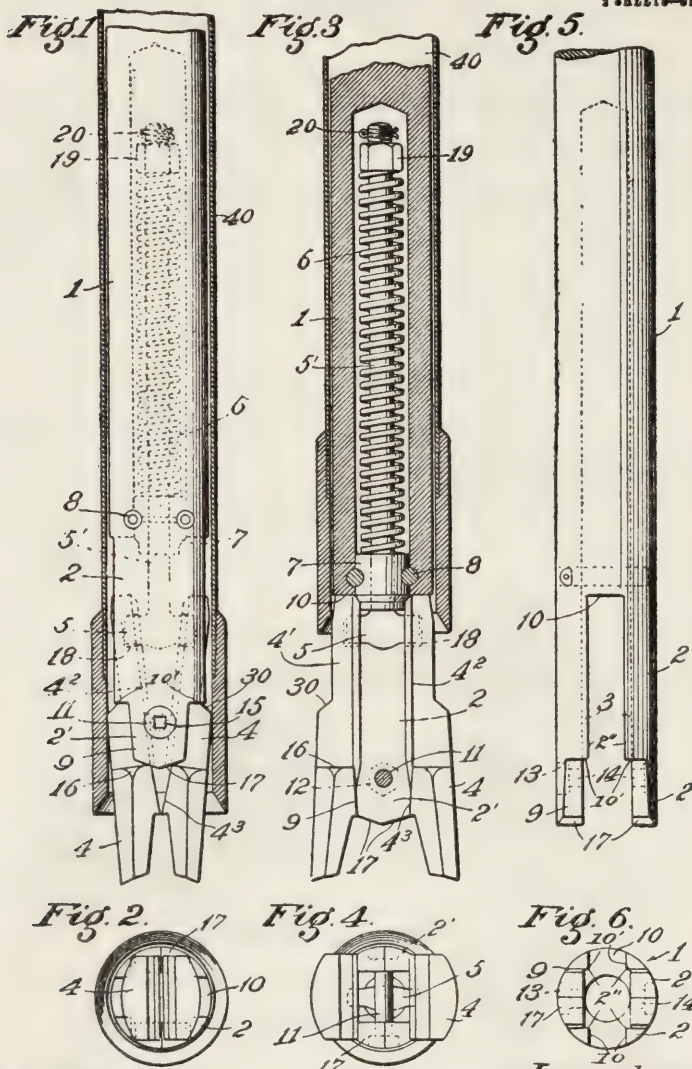
No. 827,595

PATENTED JULY 31, 1906.

E. C. WILSON.
UNDERREAMER.

APPLICATION FILED NOV. 30, 1905.

2 SHEETS-SHEET 1



Witnesses:
C. C. Kelly
C. J. Williams

Inventor,
Elihu C. Wilson
by James R. Townsend
att'y

No 827,595

PATENTED JULY 31, 1906

E. C. WILSON
UNDERREAMER

APPLICATION FILED NOV 28, 1905

2 SHEETS-SHEET 1

Fig. 7

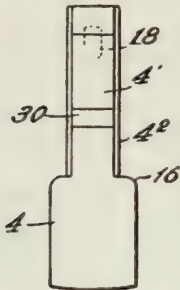


Fig. 8

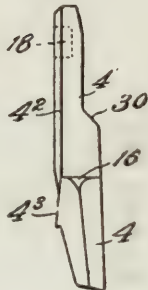


Fig. 9

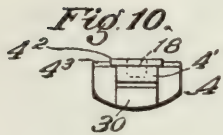
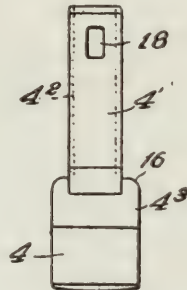


Fig. 11



Fig. 12



Fig. 13.



Fig. 14.



Witnesses:

C. C. Holly
C. J. Williams

Inventor.

Elihu C. Wilson.

By James R. Townsend
his atty.

UNITED STATES PATENT OFFICE.**ELIHU C. WILSON, OF BAKERSFIELD, CALIFORNIA.****UNDERREAMER.****No. 827,595.****Specification of Letters Patent.****Patented July 31, 1906.**

Application filed November 28, 1905. Serial No. 289,380.

To all whom it may concern:

Be it known that I, ELIHU C. WILSON, a citizen of the United States, residing at Bakersfield, in the county of Kern and State of California, have invented a new and useful Underreamer, of which the following is a specification.

Objects of this invention are to provide an underreamer of superior strength and of superior width and expansion of cutters so as to enable reaming as great a portion of the circumference of the hole as possible at each stroke, to insure greater safety against losing the cutters from the body while reaming, to avoid the necessity of a middle joint in the mandrel or reamer body, and to leave a maximum open space between the cutters to receive the loose material or sludge at the bottom of the well or other opening during the operation of drilling.

By this invention it is possible to increase the strength of the cross or T which suspends the cutters.

In this invention a cross or T formed of a single forging is provided for suspending the cutters.

Another decided advantage is simplicity and convenience of attaching and removing the cutters and suspending devices from the reamer-body.

Another advantage is facility of collapsing the cutters. I so construct the mouth of the underreamer as to dispense with stock between the collapsed cutters, thus enabling the cutters to close together. This feature makes extreme expansion possible and makes the use of maximum amount of stock in shanks of cutters possible, thus insuring maximum strength of cutters.

The accompanying drawings illustrate the invention.

Figure 1 is a view of the underreamer in a casing just before it has passed through the shoe of the casing, the parts being collapsed. Fig. 2 is a view looking at the bottom of Fig. 1. Fig. 3 is a view of this newly-invented underreamer in a well, the same having just passed through the casing-shoe and expanded for reaming the hole below. Portions are shown in mid-section. Fig. 4 is a view looking at the bottom of Fig. 3. Fig. 5 is a view of the reamer-body at right angles to Figs. 1 and 2. Fig. 6 is a view looking at the bottom of Fig. 5. Fig. 7 is a front view of a cutter detached. Fig. 8 is an edge view of a cutter at right angles to Fig. 7. Fig. 9 is a

view of the inside or back of the cutter. Fig. 10 is a view looking down on the top of the cutter. Fig. 11 is a view of the cross. Fig. 12 is a view of the cross at right angles to Fig. 11. Fig. 13 is a side view of the spring seat-block detached. Fig. 14 is a bottom view of the same.

1 designates a hollow body of an underreamer terminating in prongs 2, forming a fork, said prongs having shoulders 2' on their inner faces to form ways 3 for cutters. Said prongs are provided with and terminate in downwardly-projecting lugs 2' to spread the cutters apart.

4 designates the cutters, which are interchangeable; 4', the cutter-shank; 4², bearing-shoulders of the cutters to engage inside the ways 3; 4³, expansion bearing-faces of the cutters on the sides of said cutters.

The inner faces of the prongs 2 are parallel, and the sides or shoulders 2', which form the ways 3, are also parallel. The cutter-shank 4' and its bearing-shoulders 4² are straight—that is to say, the sides or edges thereof are parallel and fit the ways 3.

5 is a cross, 5' the stem of the cross, and 6 the spring which actuates the cross. The parts 5 5' constitute spring-actuated means for actuating the cutters to expand the same.

7 is a block forming a seat for the spring 6. One or more dowel-pins 8 may be provided as means for holding the block or spring-seat 7 in place.

9 designates the spreading bearings for holding the cutters 4 apart, and 10 the down-thrust bearings for the cutters. The down-thrust bearings 10' are in the nature of shoulders formed by the edges of the forks at the base of the lugs 2'. The prongs 2 of the body are of substantially one thickness throughout, excepting that they are reduced at their lower ends to form lugs for spreading the cutters 4 apart. The edges of the lugs 2' for the spreading bearings 9 and the prongs terminate abruptly in the shoulders 10' at the base of the lugs 2'. This construction affords the necessary operative structure with maximum strength for minimum weight of body.

11 is a detachable cross-piece in the form of a bolt secured by a nut 12. 13 is an angular socket in the outer face of one of the forks around the bolt-hole 14 in said fork. The nut 12 is conformed to the angular socket, and the bolt 11 is provided with an angular socket 15 in its head to receive a wrench (not shown) for screwing the bolt into the nut.

The expansion bearing-faces 4³ terminate at their upper ends in rounded corners or bearings 16 to ride more readily over the beveled end faces 17 of the downwardly-projecting lugs 2' to engage said bearings for expanding the cutters.

18 designates recesses in the inner faces of the cutters for engaging the ends of the cross 5.

19 and 20 indicate the usual tension-nut for the spring 6 and the cotter-pin for securing the same.

To assemble the underreamer, the block 7 will first be placed on the stem 5' of the cross 5, and the spring 6 is then adjusted and secured in place by the nut 19 and cotter-pin 20. Then the cutters are placed on the ends, respectively, of the cross 5, which seat in the recesses 18 therefor. Then the parts thus assembled are inserted into the hollow mandrel and brought into the position shown in Fig. 3, whereupon the dowelpins 8 are inserted and the cross-piece formed of the bolt 11 is then inserted. The nut 12 is placed in its angular socket 13, and the bolt or cross-piece 11 is then screwed home. The underreamer is then in condition for operation.

To use the underreamer, the cutters will be drawn down below the downwardly-projecting lugs 2', thus collapsing the same into the position shown in Fig. 1, whereupon the underreamer will be inserted into the pipe or casing in the usual manner and allowed to descend. When it has passed through the shoe, as shown in Fig. 3, the spring operates in the usual manner to draw the cross 5 up, thus bringing the cutters into the expanded position shown in Fig. 3. The rounded shoulders 16 ride readily over the beveled faces 17, and the upper ends of the cutters seat against the downthrust bearings 10, and the bearing-shoulders 4² of the cutters engage the ways 3 of the fork prongs or members 2, thereby being solidly held during the operation of underreaming. The spreading bearings 9 of the lugs 2' engage the expansion bearing-faces 4³ of the cutters at the same time, so that the tool is practically a unit during the operation of underreaming.

30 designates the usual shoulders on the cutters for drawing the same in when the tool is removed through the pipe or casing 40.

It is advisable that the lower ends of the forks 2 should not form downthrust bearings for the cutters, as there would otherwise be a tendency of crystallization of said forks, which is avoided by making the downthrust bearings at 10 only.

The cross-piece 11 serves as a brace for the prongs of the fork and prevents accidental removal of the cutters and T or cross 5.

It is to be noted that by the construction shown the cutters are quickly expanded at the initial upward movement of the same

after escaping the shoe of the casing 40, and that immediately thereafter the cutters are solidly held in the straight and parallel ways 3, and that when the cutters are fully drawn up they seat on the downthrust bearings 10 70 and the spreading bearings 9, while the shanks are rigidly held throughout their length. Said spreading bearings are on the lugs 2', which constitute wedges for wedging the cutters apart, and said bearings are at the 75 sides of the lower ends of the body, thus engaging the outer edges of the cutters to hold the cutters apart and leaving an open space between the middle portions of the cutters for a greater distance upward from the lower 80 ends of the cutters than would be the case were the cutters held apart by any intermediate portion between the lugs.

I term the cutters "shouldered cutters," for the reason that the rounded corners 16, 85 which extend away from the shank at right angles thereto, are in the nature of shoulders, the inner faces 4³ of which engage the spreading faces 9 of the side lugs 2' to brace the cutters and hold them apart. 90

What I claim is—

1. An underreamer-body terminating in prongs having projecting lugs at their lower ends with spreading bearings 9 for holding the cutters apart. 95

2. An underreamer-body terminating in prongs and provided with upper and lower bearings for the cutters, said prongs having projecting lugs, the edges of which form lower bearings for holding the cutters apart, 100 and the ends of said lugs having beveled end faces.

3. An underreamer-body terminating in prongs the inner faces of which are provided with straight parallel ways, the ends of said 105 prongs terminating in lugs below said ways to spread and hold the cutters apart.

4. An underreamer-body terminating in prongs forming a fork, said prongs having shoulders on their inner faces to form ways 110 for the cutters.

5. A hollow underreamer-body terminating in prongs forming a fork having shoulders on the inner faces to form ways for the cutters, cutters in said ways, a cross in said 115 low body for operating said cutters, a spring for operating the cross, a block in the body to form a seat for said spring, and one or more dowel-pins securing the block in place.

6. A hollow underreamer-body, cutters, a 120 cross inside the hollow body for operating said cutters, a spring for operating said cross, a block in said body forming a seat for said spring, and one or more dowel-pins for holding the block in place, said block and pins being located entirely above the head of the 125 cross.

7. A hollow underreamer-body terminating in prongs forming a fork and provided with ways and downthrust bearings for cut- 130

- ters, cutters in said ways engaging said bearings, a cross for operating said cutters, a spring for actuating said cross, a block forming a guide for the stem of the cross and a seat for the cross-actuating spring, its lower end terminating above the head of the cross and projecting below the downthrust bearings to hold the upper ends of the cutters apart, and means for holding the block in the reamer-body.
8. A hollow underreamer-body terminating in prongs forming a fork, said prongs having shoulders on their inner faces to form ways, cutters in said ways, means for operating the cutters, and a detachable cross-piece connecting the ends of the fork.
9. An underreamer-body terminating in prongs forming a fork and provided with shoulders on the inner faces of the prongs which form cutter-ways and terminate in downwardly-projecting lugs, and cutters mounted between the prongs of said fork and having shoulders inside the fork and faces to bear on the projecting lugs.
10. An underreamer-body terminating in prongs having projecting lugs at their lower ends to hold the cutters apart.
11. An underreamer-body terminating in prongs forming a fork having beveled faces at the ends of its prongs, cutters having shoulders to ride over said beveled faces, and means for suspending said cutters in said body.
12. An underreamer-body terminating in prongs forming a fork, the ends of said prongs being provided with lugs to spread the cutters apart.
13. An underreamer-body terminating in prongs forming a fork, said prongs having shoulders on the inner faces to form ways for the cutters, and said prongs terminating in lugs to act as spreaders for the cutters.
14. A hollow underreamer-body terminating in prongs forming a fork, said prongs terminating in lugs for spreading the cutters, said lugs having beveled ends to engage bearings on cutters to expand cutters.
15. An underreamer-body terminating in prongs forming a fork, said prongs terminating in lugs or projections, said lugs having beveled faces or bearings to expand the cutters, and also faces or bearings for the cutters to rest on after they have expanded to a normal position for reaming.
16. An underreamer-cutter having two shoulders and a bearing-face on the inner side of each of the two shoulders of the cutter.
17. An underreamer-cutter having a shank and a shoulder on either side of the shank of the cutter, each of said shoulders projecting at right angles to the shank of the cutter and having a bearing-face on its inner side.
18. An underreamer having a body terminating in a fork, and cutters suspended between the prongs of the fork, the ends of said prongs constituting wedges to wedge between the cutters.
19. An underreamer comprising a body terminating in two prongs, and cutters each having two shoulders and a bearing-face on the inner side of each of the two shoulders to engage said prongs.
20. An underreamer comprising a body terminating in prongs the inner faces of which are provided with straight parallel ways, and cutters having straight shanks fitting said ways, the ends of said prongs terminating in lugs below said ways to spread and hold the cutters apart.
- In testimony whereof I have hereunto set my hand at Bakersfield, California, this 20th day of November, 1905.
- ELIHU C. WILSON.
- In presence of—
H. I. TUPMAN,
T. E. KLOPSTEIN.

1905

A. O. W.

CONTENTS:

Reamers

Print May 31, 1906.

OK

1/2. Application papers.

1. Amdt. A. Dec. 26-05.
2. Rej. Jan. 9-06. 166. Artesian & Oil Wells
3. Amdt. B. Mar.-12-06. 6. Reamers
4. Rej. Mar. 21-06.
5. Amdt. C. Mar. 27-06.
6. Letter April 3-06.
7. Amdt. D. Apr. 16-06.
8. Amdt. (drg.) Apr. 16-06.
9. Rej. May 4-06.
10. Amdt. E. May 12-06.
11. Amdt. (drg.) May 12-06.
12. Rej. June 7-06.
13. Letter Affidavit Print June 18-06.
14. Letter June 23-06.
15. Amdt. F. July 3-06.
- 16.
- 17.
- 18.
- 19.
- 20.
21. U. S. Patent Office,
22. DEC. 1, 1905.
23. DIVISION 38.

TITLE:

Improvement in Underreamers.

[Endorsed]: No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Complainants' Exhibit Wilson File Wrapper Contents. Filed ———. F. D. Monckton, Clerk.

Complainants' Exhibit Cummings Patent.

[Endorsed]: U. S. Dist. Court, So. Dist. of Cal., So. Div. #1540—Equity. Union Tool Co. et al. vs. Wilson & Willard Mfg. Co. "Complainants' Exhibit Cummings Patent." Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Complainants' Exhibit Cummings Patent. Filed May 8, 1917. F. D. Monckton, Clerk.

No. 819,042.

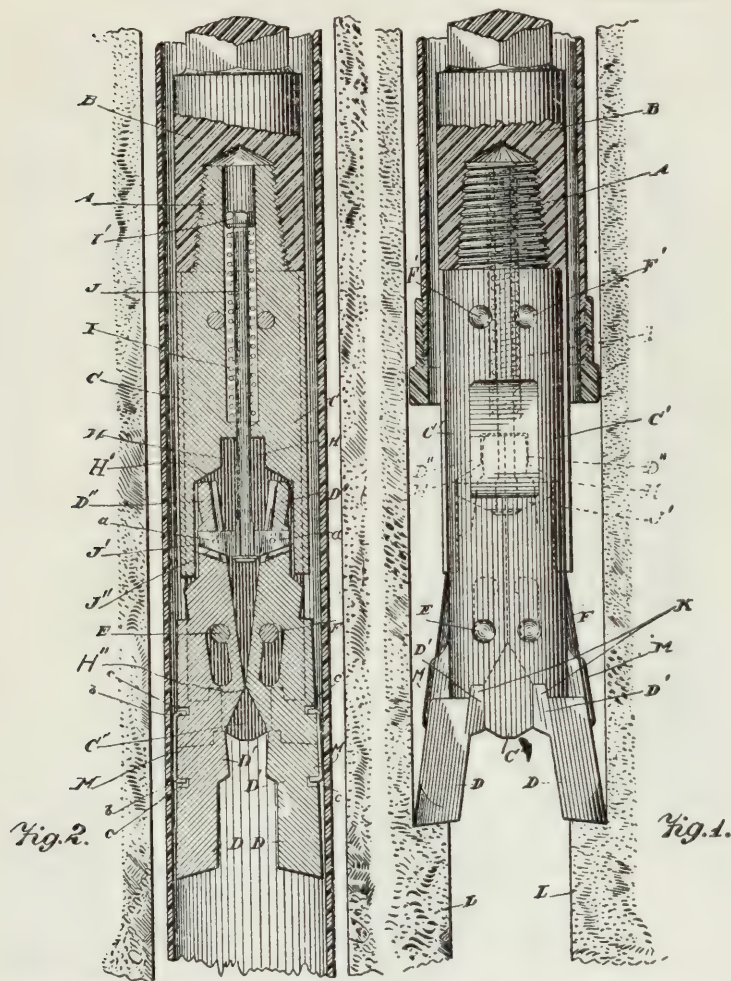
PATENTED MAY 1, 1906.

A. CUMMINGS.

UNDERREAMER FOR MINERAL BORING.

APPLICATION FILED FEB. 25, 1905.

2 SHEETS—SHEET 1.



Witnesses.
Tracy, B. H. L.
Wadsworth Day.

Inventor.
Alexander Cummings.
By *Atty. S. John Day*

No. 819,043.

PATENTED MAY 1, 1906

A. CUMMINGS.

UNDERREAMER FOR MINERAL BORING.

APPLICATION FILED FEB. 25, 1905.

2 SHEETS—SHEET 1

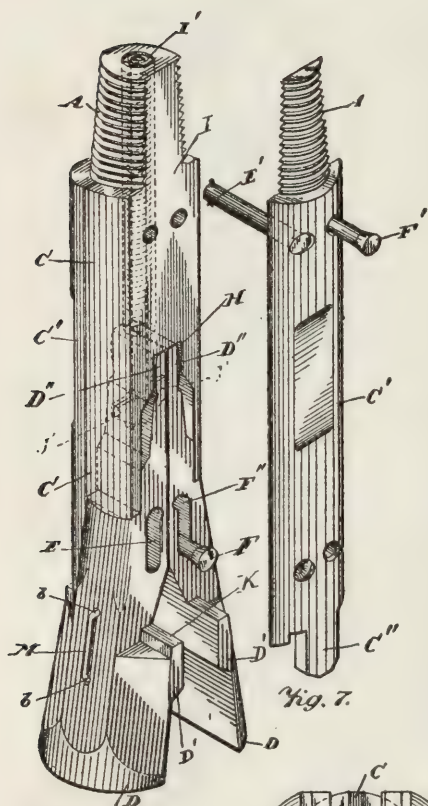


Fig. 6.

Fig. 7.

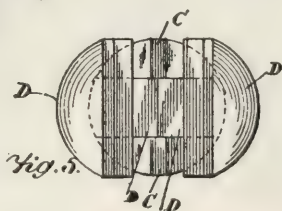


Fig. 5.

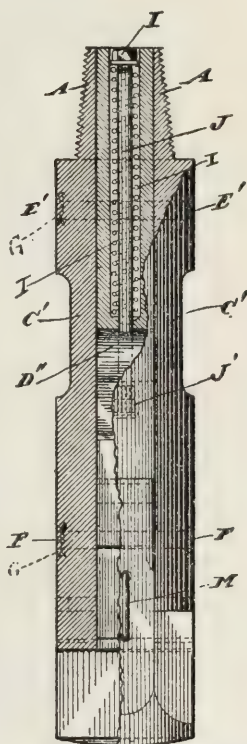


Fig. 3.

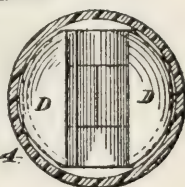


Fig. 4.

Witnesses.

Lucy B. Satoke
Hedraiah Day

Inventor.

Alexander Cummings.

By

Att'y. S. John Day

UNITED STATES PATENT OFFICE.

ALEXANDER CUMMINGS, OF LOS ANGELES, CALIFORNIA.

UNDERREAMER FOR MINERAL BORING.

No. 819,042.

Specification of Letters Patent.

Patented May 1, 1906.

Application filed February 25, 1905. Serial No. 247,240 1/2.

all whom it may concern:

Be it known that I, ALEXANDER CUMMINGS, of the city of Los Angeles, in the county of Los Angeles, in the State of California, have invented a new or Improved Underreamer for Mineral Boring, of which the following is a full, clear, and exact description or specification, reference being had to the annexed drawings, and to the letters marked thereon.

This invention, which relates to certain new and useful improvements in the construction and operation of underreamers, such as are used in enlarging a bore-hole or well which has been drilled in mineral formations or strata of the earth's crust, consists of a pair of cutting-jaws which are capable of being closed sufficiently to enable the underreamer to be lowered through the casing which is usually employed to line and protect such bore-holes or wells. These jaws are each pivoted to the upper part of the device by which the cutting edges of the underreamer are connected to the rods of the mineral-boring apparatus, and these parts are otherwise so constructed that while during descent of the underreamer within the casing the jaws are closed together and prevented from bearing directly against the interior of the casing, yet the cutting parts of the jaws are free to open outward to the width necessary for the underreaming operation so soon as the underreamer has passed downward and sufficiently far below the bottom of the casing to enable the underreaming operation to be proceeded with.

Upon the annexed drawings, Figure 1 is an elevation of my new or improved underreamer, showing the cutting-jaws in their fully-opened position and as they appear and are situated in the act of underreaming a bore-hole below the casing or lining shown in the upper part of the figure in transverse section, the lower part of the auger-stem to which my new or improved underreamer is connected by a tapered screw in the ordinary manner being also shown in transverse section. Fig. 2 is a vertical section of my new or improved underreamer, showing the cutting-jaws and all the other parts of the device in the position which they occupy when within the casing of the bore-hole or well. Fig. 3 is a view of my new or improved underreamer, partly in elevation and partly in transverse section, showing the same at right angles to Figs. 1 and 2. Fig. 4 is a transverse section of the casing, showing the bottom of

the underreamer as it appears when descending through or inclosed within the casing. Fig. 5 is an inverted plan of the bottom of the underreamer, showing its cutting-jaws opened out to their full width or in their operating position corresponding to Fig. 1. Fig. 6 is a perspective view of my new or improved underreamer, showing one of the detachable parts thereof removed in order to the better display the construction of the interior parts of the device. Fig. 7 is a perspective view of one of the lateral detachable parts.

As shown by Figs. 1 to 7, my underreamer is attached to the ordinary auger-stem by means of a tapered screw A, screwed into the socket B. The stock or body of the underreamer comprises a part C, between the lateral parts C' of which the cutting-jaws D are disposed, pins E and F extending transversely therethrough. Pins E and F aside from assisting in guiding the jaws in their movement within the stock also cooperate with the pins E' and F' to securely connect the lateral pieces C' with the part C. The lower and upper pins E F and E' and F' are preferably formed with tapered heads at one end fitting into corresponding holes in the sides C' C', as shown in the drawings, while through a hole in the opposite end of each a split pin G is passed to prevent the respective pins from in any way falling out of the holes in which they are contained.

The jaws D are held in their open position (shown at Figs. 1, 5, and 6) by the lower portion C'' of each lateral piece C', becoming situated between the parts D' when the jaws D are drawn into their uppermost position—that is to say, with the upper parts D'' D'' bearing against the top and between the sides of the recess H, as shown dotted in Fig. 1 and in full lines in Figs. 3, 5, and 6.

The inner walls of the reamer at H' H' are shouldered or inclined at an angle adjacent to the recesses H H to engage the upper ends D'' D'' of the jaws when the latter are in the lowered position. (Shown in Fig. 2.) At intermediate points H'' upon their adjacent faces the jaws D are formed with angular engaging portions in pivotal contact, the action of the jaws when moved in a vertical direction within the body of the reamer being to rock upon each other, the lower or cutting ends of the jaws being expanded and the upper ends D'' D'' retracted, or vice versa, as a consequence of the engagement of said ends D'' with the inclined shoulders H'.

The cutting-jaws D are drawn upward into open position by the action of the compressed spring I against the washer beneath the nut I', forcing the rod J and its cross-tail J' (whose ends are within the slots J'', Fig. 2, formed in the top of each cutting-jaw D) upward and in such relationship of the parts that the cutting-jaws D D are not only open fully outward into their cutting positions, as shown on the drawings, but are maintained in the cutting positions by the action of the spring I, the rod J, and the cross-tail J'', holding the cutting-jaws D D in close contact with the lower ends of the lateral pieces 15 C' and the upper prolongations D'' D'' of these jaws in hard contact with the top of the recess H.

For the more securely holding of the cutting-jaws D D in their operative positions 20 each jaw has vertical projections K, which enter into corresponding recesses in the lower end of each lateral piece G'. The slots E'' and F'' in each jaw-piece, respectively, are constructed with the upper end of each of 25 these slots widening inward, as shown particularly at Figs. 1, 2, and 6, the reason for this extension of these slots in the manner and directions shown in the drawings being to prevent the pins E and F from impeding the moving of the jaws D D into their closed position when the jaws are drawn downward or outward from the other parts of the under- 30 reamer device—as, for example, when entering it into the casing B, when lowering the under- 35 reamer down the casing B, or in drawing it upward into and through the casing B—when the bore-hole is ready for the chips and sand accumulated therein from the underreaming operations to be removed by lowering the sand-pump or equivalent device, as is well 40 understood in the practice of mineral boring.

The cross-tail J' has a rod-receiving opening of the proper shape to receive the end of the spring-actuated rod J, the latter being 45 swaged with a rounded head and ribs on opposite sides of said head to prevent rotation of the rod when the nut I' is being placed in position thereon.

To prevent the cutting edges of the jaws 50 D D from coming into contact with the inner surface of the casing C, either when being lowered or being raised through the casing B, each jaw D may be fitted with a removable contact-piece M, which is thick enough to 55 bear with its outer narrow edge against the interior of the casing B, while the inner edge bears against the outer parts of the jaws D D and their connections, as shown at Fig. 2, thus maintaining the cutting edges of the 60 jaws out of contact with the interior surface of the casing B while the underreamer is being passed therethrough.

The contact-pieces M are readily detachable and the ends thereof are bent angularly 65 to enter holes c c, spaced apart upon the outer

faces of the jaws. These contact-pieces are constructed of various sizes of either square or round rods, the size of the rod employed determining the distance between the cutting-jaws and the casing. The cutting-jaws, 7 as shown, are formed angular upon their outer faces and are rounded at the base adjacent to their cutting edges to permit the jaws to be more readily withdrawn and inserted into the casing. 7

It is to be understood that in place of constructing the sides C' of the body C of the underreamer removable or detachable, as hereinbefore described and shown on the drawings, the sides C' may also be in one solid 8 piece of metal with the central body part C, in which case the upper pins E' F' are not used.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an underreamer, a body having a recess extending upwardly into its lower end, a pair of jaws vertically movable in the recess and having tilting engagement with each other, the sides of the jaws being in firm sliding contact with the walls of the recess, and means for actuating the jaws to cause the upper ends thereof to contract simultaneously with the expansion of their lower ends, substantially as shown and described. 9

2. In an underreamer, a body having a recess extending upwardly into its lower end between lateral portions thereof, a pair of jaws in tilting engagement with each other, 1 having free vertical movement between said lateral portions but held from sidewise movement by said lateral portions, means for actuating the jaws to cause the upper ends thereof to retract simultaneously with the 1 expansion of their lower ends, and transverse guide-pins carried by the lateral portions of the body adapted to engage the jaws to guide them in their movement, substantially as shown and described.

3. In an underreamer, a body provided with a socket at its lower end, a pair of jaws vertically slidable in said socket and provided upon their adjacent faces with angular fulcrum portions in contact, said jaws also having slots adjacent to their fulcrum portions, guide-pins carried by the body and extending through said slots, resilient means for holding said jaws normally in raised position in the socket in the body, and means for actuating the jaws to cause the upper ends thereof to retract simultaneously with the expansion of the lower ends thereof, substantially as described.

4. In an underreamer, a body having projection portions C'' and provided with recesses adjacent to said portions, a pair of jaws slidable in the lower end of the body and in tilting engagement with each other, means for normally maintaining said jaws in ele- 1

vated position in the body, and lateral portions upon said jaws engaging the sides of the portions C" and entering the recesses adjacent thereto to hold the lower ends of the jaws apart when elevated, substantially as described.

5. In an underreamer, a body having a socket at its lower end, a pair of jaws in said socket in tilting engagement with each other, said jaws having slots adjacent to the tilting portions, guide-pins carried by the body and extending through the slots in the jaws, means for holding the jaws normally in raised position, means for expanding the lower ends of the jaws when in raised position, and portions C" upon the body disposed between the lower ends of the jaws and adapted to positively hold the latter expanded when raised, substantially as described.

6. In an underreamer, a body, a pair of jaws vertically slidable in the body, means for normally holding said jaws in raised position, means for expanding the lower ends of the jaws when in raised position, and inter-engaging portions disposed at the lower end of the body and on the sides of the jaws to positively hold the latter expanded when in raised position, substantially as described.

7. In an underreamer, a body provided with downwardly-projecting portions C" at its lower end, a pair of jaws vertically movable in the body and in tilting engagement with each other, means for normally holding said jaws in raised position, and laterally-projecting portions upon said jaws adapted to contact with the portions C" when the jaws are raised to positively hold the latter open, substantially as described.

8. In an underreamer, a body having a socket provided with recesses H at its upper end and having the inclined shoulders H' adjacent to said recesses, said body having the projection C", and upwardly-extending recesses at the sides of the projection C', a pair of jaws disposed in the socket in the body, each jaw having a shank the upper end of which is adapted to engage one of the inclined shoulders H' and be guided into the recess H, projections K on opposite sides of each jaw adapted to enter the recesses at the sides of the portions C", said jaws also having contacting angular portions upon their adjacent faces, a spring-actuated rod disposed axially in the upper end of the body, and a cross-tail carried at the lower end of said rod adapted to engage the upper ends of the jaws, substantially as described.

9. In an underreamer, a body provided with a socket, a pair of jaws slidably mounted in the socket in pivotal contact with each other, said jaws being provided on their outer faces with a pair of spaced perforations, and detachable contact-pieces adapted to be interposed between the face of the jaws and the well-casing, said contact-pieces consisting of metal bars having angular bent ends adapted for insertion into said spaced perforations, substantially as described.

In testimony whereof I, the said ALEXANDER CUMMINGS, have hereunto set my hand and seal, at Los Angeles aforesaid, in the presence of two subscribing witnesses.

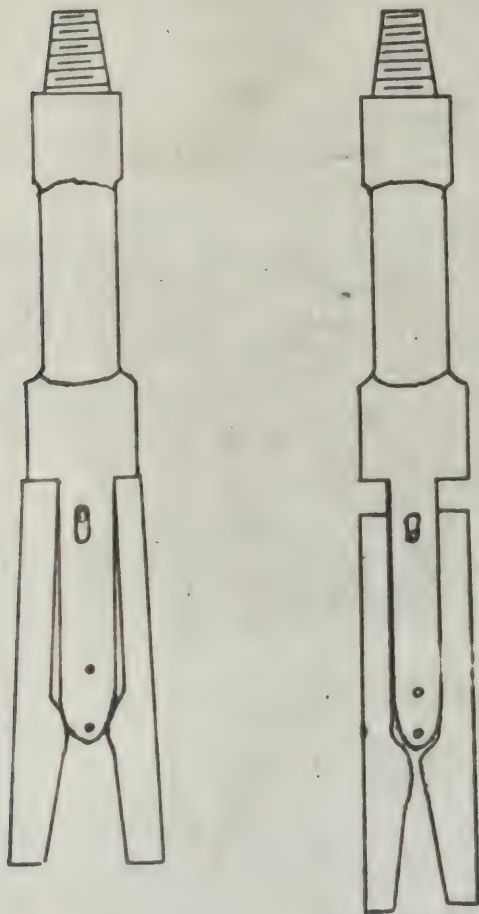
ALEXANDER CUMMINGS. [L. s.]

Witnesses:

ST. JOHN DAY,

HADASSAH DAY.

CANADIAN UNDER REAMER



Position of slips for lowering,
when Reamer strikes bottom breaks
locking pin & spreads slips as shown.

OIL WELL SUPPLY CO.
PITTSBURG, PA.,
U.S.A.

Not recommended for cable tool
Nov. 15 1902.

[Endorsed]: C. C.—1540. Union Tool Co. vs. Wilson & Willard Mfg. Co. Complainant's Exhibit Blue Print of Oil Well Supply Co. Canadian Under Reamer, 1902. Filed Feb. 25, 1916. Wm. Van Dyke, Clerk. F. F. Greely, Deputy.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Complainant's Exhibit Blue Print of Oil Well Supply Co. Canadian Under-reamer. Filed May 8, 1917. F. D. Monckton, Clerk.

Defendant's Exhibit O'Donnell & Willard Patent.

[Endorsed]: U. S. Dist. Court, So. Dist. of Cal., Southern Division. No. 1540. Union Tool Co. et al. vs. Wilson & Willard Mfg. Co. Defendant's Exhibit O'Donnell & Willard Patent. Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit O'Donnell & Willard Patent. Filed May 8, 1917. F. D. Monckton, Clerk.

No. 762,435.

PATENTED JUNE 14, 1904.

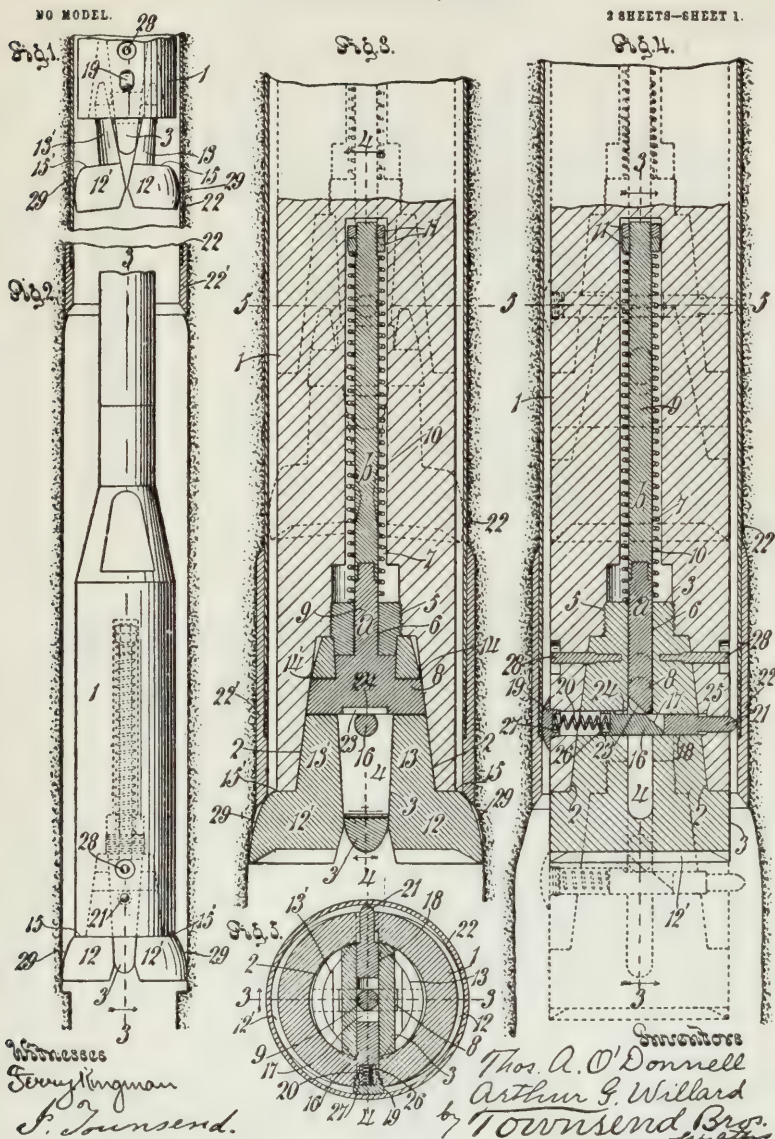
T. A. O'DONNELL & A. G. WILLARD.

UNDERREAMER AND DRILL.

APPLICATION FILED DEC. 8, 1899.

NO MODEL.

28 SHEETS--SHEET 1.



No. 762,435.

PATENTED JUNE 14, 1904.

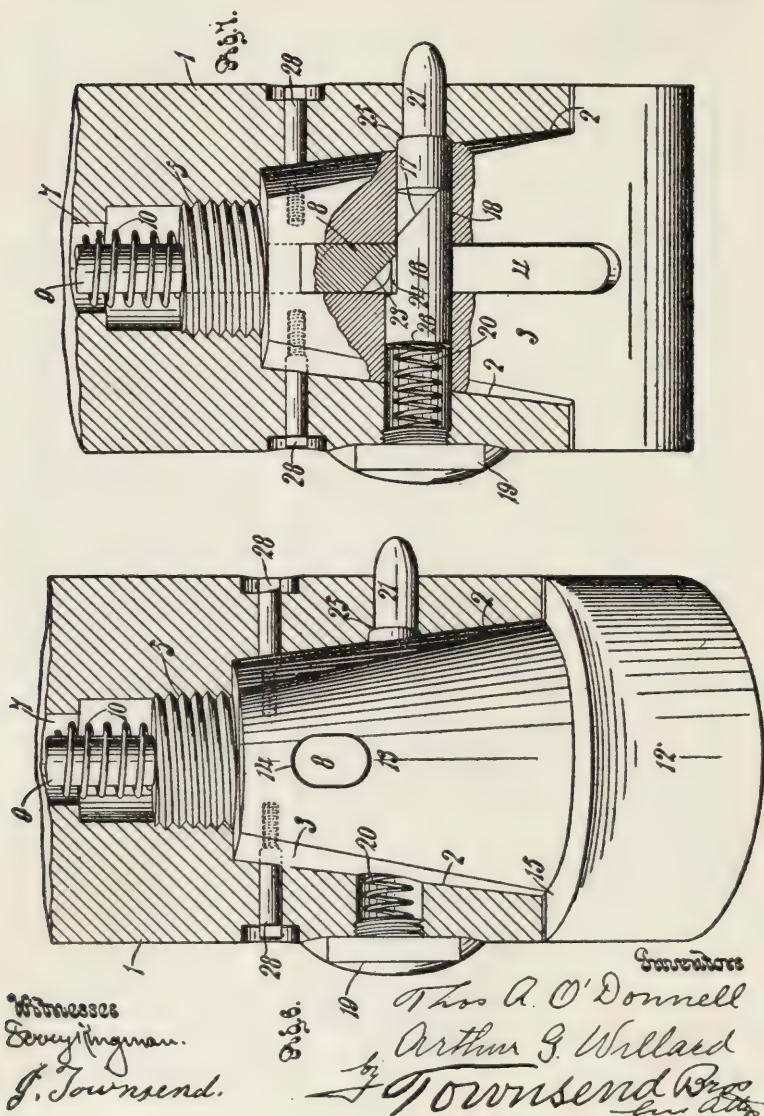
T. A. O'DONNELL & A. G. WILLARD.

UNDERREAMER AND DRILL.

APPLICATION FILED DEC. 9, 1899.

NO MODEL.

3 SHEETS—SHEET 1.



No. 762,435.

Patented June 14, 1904.

UNITED STATES PATENT OFFICE.

THOMAS A. O'DONNELL AND ARTHUR G. WILLARD, OF LOS ANGELES, CALIFORNIA.

UNDERREAMER AND DRILL.

SPECIFICATION forming part of Letters Patent No. 762,435, dated June 14, 1904.

Application filed December 8, 1899. Serial No. 739,712. (No model.)

all whom it may concern:

Be it known that we, THOMAS ARTHUR O'DONNELL and ARTHUR GAY WILLARD, citizens of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Underreamer and Drill, of which the following is a specification.

The object of our invention is to provide an underreamer and drill which can be readily lowered through a casing smaller than the hole to be drilled and which in operation will expand below the casing and will ream out and drill a hole below the casing larger than the casing and which can invariably and without difficulty be drawn up through the casing whenever it is so desired. This underreamer is adapted for use in all kinds of formation and in deep wells, such as oil-wells and Artesian wells. A difficulty to be avoided in the use of underreamers is the liability of damaging the shoe or lower end of the casing when it is attempted to ream close to the casing.

One object of our invention is to avoid any danger of such injury to the casing when reaming close to the casing, but at the same time providing for the positive locking of the jaws while they are below the casing. It is very important in the operation of underreamers that the jaws shall be positively locked when they are working underneath the casing, so that there shall be no looseness of parts and the liability of the jaws being crowded together failing to cut.

Another object of our invention is to so construct the underreamer that there will be no openings through which dirt can get into the inside of the underreamer to cause clogging or unnecessary wear.

Another object of our invention is to provide for the absolute automatic operation of the locking and unlocking device, so that whenever the reamer passes below the casing it will immediately expand and positively lock, and whenever it is drawn upward sufficiently it will cause the jaws to engage the casing the jaws will collapse and pass into the casing without any obstruction.

The accompanying drawings illustrate our invention.

Figure 1 is a fragmental view showing a side elevation of the lower end of our underreamer as it appears in passing down inside the well-casing. In this view the side of the stock which is at the left in Fig. 4 is shown. Fig. 2 is a like view showing the underreamer in operation below the casing. In this view the side of the stock which is at the right in Fig. 4 is shown. Fig. 3 is a vertical mid-section on line 3 3, Figs. 2, 4, and 5. Fig. 4 is a vertical mid-section on line 4 4, Figs. 3 and 5. Fig. 5 is a sectional plan on a plane cutting through the locking-bolt. The plane of this section is indicated by the line 5 5, cutting through the dotted position shown in Figs. 3 and 4. Fig. 6 is a fragmental perspective detail view showing the interior parts, which are detachable from the stock. A fragment of the stock is shown in vertical mid-section. Fig. 7 is a like fragmental perspective view illustrating the interior parts in further detail.

1 indicates the stock, provided with an upwardly-tapering frusto-conical socket 2 in its lower end, which socket is practically formed into two tapering sockets by a vertically-slotted wedge-shape partition 3, extending across the socket 2 of the stock and fitted at its opposite edges to the socket and provided with a transverse slot 4. The upper end of the partition 3 is screw-threaded, as at 5, and screwed into the stock.

6 indicates a way through the upper end of the partition, leading from the slot 4 into a spring-chamber 7, provided in the stock above the partition.

8 indicates a cross-head in the slot and provided with a stem 9, extending through the way 6 into the spring-chamber.

10 indicates the spring in the spring-chamber for normally holding the stem up.

11 indicates nuts on the upper end of the stem to rest upon the spring.

12 indicates a jaw member provided with a tapering shank 13 to fit in one of the tapering shank-sockets formed between the partition 3 and the wall of the tapering socket 2 in the end of the stock. The shank 13 is provided with a cross-head socket 14 in the extended plane of the slot 4 of the partition. The jaw member is provided with a shoulder 15 to fit

against the lower end of the stock when the shank is fully seated in the tapering socket. 12' indicates a like jaw member provided with the shank 13', cross-head socket 14', and shoulder 15', and said jaw member 12' is arranged with its shank in the other socket formed therefor between the partition 3 and the wall of the tapering socket 2. The cross-head 8 is arranged to play in the slot 4, and its opposite ends are inserted in the cross-head sockets 14 14', so that the two jaw members are carried by the spring 10 through the medium of the stem and cross-head.

16 indicates a spring-pressed bolt normally extending across the slot 4 in the path of the cross-head 8 to lock the cross-head against lowering. In Fig. 3 the normal locking position of this bolt is indicated in dotted lines at the lower end of the view. The outer end of the bolt is provided at its upper side with a beveled face 17, which is normally chambered in a portion of the bolt-hole 18, which extends through the partition and through the stock, being closed at one end by a screw-plug 19.

20 indicates a spring in the bolt-hole to normally hold the bolt 16 normally inserted across the slot 4 with its beveled portion 17 fully beyond the slot.

21 indicates a bolt-retracting pin mounted in the bolt-hole and normally projecting from the side of the stock to be engaged and thrown by the well-casing 22 to bring the bolt 16 into position shown in solid lines in Fig. 4, with the beveled face 17 of the bolt in the path of the cross-head 8. The cross-head 8 has a beveled face 23 to engage the beveled face 17 of the bolt when the bolt is in its retracted position. (Shown in solid lines in Fig. 4.)

40 The spring 10 is of sufficient strength to normally hold the jaws 12 12' in their up-drawn position, with their shanks fully seated in the sockets therefor. The bolt-hole 18 is larger at the end which is closed with the plug 19 than at the opposite end, and shoulders 24 and 25 are provided to respectively prevent the bolt and the bolt-retracting pin from being thrown too far by the force of the bolt-spring 20. Preferably the bolt 16 is provided with a chamber 26 to seat one end of the spring 20, and the spring-holding plug 19 is provided with a like chamber 27 to seat the other end of the spring 20.

For convenience in assembling the parts 55 the cross-head stem 9 is made of two parts, one of which, *a*, is integral with the cross-head and the other, *b*, is screwed to the part *a*. The part *a* of the stem together with the cross-head are of less length than the slot 4, and said stem is of greater length than the way 6, so that the part *a* and cross-head 8 can be inserted into the slot and the section *a* then pushed up through the way 6. Then the section *b* of the stem 8 is screwed onto the section *a*, after which the spring is placed in

position and the nuts 11 screwed down into place to give the appropriate tension to the spring which rests upon the upper end of the partition 3. Then the jaws 12 12' are placed against the sides of the partition with their sockets 14 14' caught over the ends of the cross-head 8, and the parts thus assembled are inserted into the conical socket 2 and turned to screw the screw-threaded upper end of the partition into the screw-threaded part therefor in the stock. 28 indicates a screw inserted through the stock and screwed into the partition to prevent the partition from unscrewing. After the parts have thus been assembled the bolt-retracting pin 21 is inserted into the bolt-hole and guideway 18. Then the bolt 16 is inserted into the bolt-hole 18 and the spring 20 is brought into place and the plug 19 screwed home. The tool is then in condition for operation.

In practical operation in order to start the tool down into the well through the casing 22 the workman will first push the bolt-retracting pin 21 into the position indicated in solid lines in Fig. 4 and then will draw the jaws 12 12' down into the position indicated in Fig. 1. Then the tool will be let down into and allowed to pass through the casing. It is to be observed in Figs. 1 and 4 that the jaws are rounded, as at 29, so that the cutting edge of the jaws are returned when the jaws are in their down-drawn position, so that the cutting edges will not touch the casing during the descent of the tool. When the tool has passed beyond the shoe 22' of the casing, the spring 10 draws the cross-head up, thus drawing the bits up into their socket in the stock. The jaws engaging the walls of the well will be held thereby sufficiently so that the downward stroke of the stock assists the action of the spring to seat the jaw-shanks firmly in their sockets, thus bringing the shoulders 15 15' to fit firmly against the end of the stock. The spring 20 throws the bolt 16 and the pin 21 so that the beveled face 17 of the bolt is chambered in the partition, and the cross-head is thus effectually locked against drawing out of the stock on the upstroke of the stock. Whenever the tool is drawn upward so far that the pin 21 is again forced in by the shoe 22' of the casing, the bolt is thrown into its unlocking position, so that when the shoulders 15 15' of the jaws engage with the shoe 22' the cross-head is free to slip in the stock, thus to allow the stock to be drawn up while the jaws collapse into the position indicated in solid lines in Fig. 1 and in dotted lines in the upper position in Fig. 3. The tool can therefore be readily drawn out through the casing and can be lowered and raised at pleasure, and whenever it is below the casing it is ready for effective operation, as before described.

The partition 3 is flat-faced and holds the jaws spread apart when the shanks are fully

seated in the shank-sockets. The ends of the cross-head have sufficient play in their sockets to allow the jaws to swing freely toward each other as the shanks withdraw from the shank-sockets.

The bolt and its retracting-pin are to be located as close as possible to the shoulders and the cutting edges of the jaws, so that the jaws may become locked as soon as possible after passing below the lower end of the casing and will work in locked position very close to the bottom of the casing, and yet will always be fully unlocked before the shoulders can injure the bottom of the casing on an upstroke.

What we claim, and desire to secure by Letters Patent of the United States, is—

1. An underreamer comprising a stock provided with two tapering sockets in its lower end, a vertically-slotted wedge-shaped partition between the sockets, and having bolt-holes opening from the slot axially in line with each other below the top of such sockets, such stock being also provided with a spring-chamber above the partition; a jaw member provided with a tapering shank to fit in one of said sockets, and also provided with a shoulder to fit against the lower end of the stock when the tapering shank is seated in its socket, said shank being provided with a cross-head socket in the extended plane of said slot; a like jaw member having its shank seated in the other socket of the stock; a cross-head to play in the slot and having its opposite ends seated in the sockets of the shanks, respectively, and having a stem extending up into the spring-chamber; a spring in said chamber for normally holding up the stem, cross-head and jaws; a spring-pressed bolt normally extending across the slot in the path of the cross-head to lock the cross-head against lowering, said bolt having at the upper side of its end, a beveled portion normally chambered in the partition; a spring for normally holding the bolt in its locking position; and a bolt-retracting pin mounted in the bolt-hole and normally projecting from the side of the stock to be thrown by the well-casing to bring the bolt into position with the beveled portion of the bolt in the path of the cross-head.

2. The combination of a stock provided with a tapering socket in its lower end and with a spring-chamber above said socket and with a screw-threaded portion between said spring-chamber and said socket; a wedge-shaped partition fitted in the socket of the stock and provided with a transverse slot and screwed into the stock and provided with a way leading from the slot through the upper end of the partition; a cross-head in the slot and provided with a stem extending through the way into the spring-chamber; a spring in the spring-chamber for normally holding the stem up; two jaw members carried by the cross-head on the opposite sides of the parti-

tion and each provided with a tapering shank to fit the stock-socket on opposite sides of the partition and also provided with a shoulder to engage the lower end of the stock when the shanks are seated in their sockets in the stock; a spring-pressed bolt to play across the slot in the partition and provided with a beveled portion at the upper side and outer end; and a bolt-retracting pin mounted in the stock and normally projecting from the side of the stock to be thrown by the well-casing to bring the bolt into position with the beveled portion of the bolt in the path of the cross-head.

3. In an underreamer, the combination with a jaw-carrying head having a transverse guideway, of a locking-bolt for said head arranged in said guideway; a pin sliding in said guideway to retract the bolt to unlock the head; a stop for said pin being provided in the guideway; and a spring to normally press the bolt toward the stop and into locking position, and to project the pin from the head to be returned by contact with the casing.

4. An underreamer-stock provided with a socket in its lower end; a slotted, downwardly-tapering partition rigidly fixed in the socket to form two shank-seating sockets to seat the shanks of two jaws on opposite sides of said partition; a jaw on each side of said partition and a jaw-carrying head moving in the slot of said partition.

5. An underreamer comprising a stock, the lower end of which has two upwardly-tapering shank-seating sockets with a flat-faced downwardly-tapering partition rigidly fixed between said shank-seating sockets; a vertically-movable cross-head in the slot of the partition; shouldered jaws carried by said cross-head; and an upwardly-tapering shank for each socket.

6. An underreamer comprising a stock provided with a socket in its lower end; a stationary slotted partition fastened in the socket and extending from side to side thereof to form two shank-seating sockets to seat the shanks of two jaws on opposite sides of said partition; a jaw-carrying head moving in the slot of said partition; means for yieldingly holding said head up; and jaws carried by said head and having shanks seated in said sockets.

7. An underreamer comprising a stock provided with a plurality of tapering sockets in its lower end; a stationary, vertically-slotted partition separating the socket; a jaw member; a tapering shank for said jaw member, said shank being provided with a cross-head socket in the extended plane of said slot; a like jaw member having its shank seated in an opposite socket of the stock; a cross-head to play in the slot and having opposite ends seated in the sockets of the shanks, respectively, and having an upwardly-extending stem; means for yieldingly holding up the stem cross-head and jaws; a spring-pressed bolt normally extending across the slot in the path of the cross-

head to lock the cross-head against lowering,
said bolt having at its upper end a beveled
portion; a spring for normally holding the
bolt in its locking position; and means adapt-
5 ed to be engaged by the well-casing to bring
the bolt into position with the beveled portion
thereof in the path of the cross-head.

In testimony whereof we have signed our

names to this specification, in the presence of
two subscribing witnesses, at Los Angeles,
California, this 28th day of November, 1899.

THOS. A. O'DONNELL.

ARTHUR G. WILLARD.

Witnesses:

JAMES R. TOWNSEND,

FRANCIS M. TOWNSEND.

Defendant's Exhibit Swan Patent 683,352.

[Endorsed]: U. S. Dist. Court, So. Dist. of Cal., So. Div. No. 1540—In Equity. Union Tool Co. et al. vs. Wilson & Willard Mfg. Co. "Defendant's Exhibit Swan Patent 683,352." Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit Swan Patent 683,352. Filed May 8, 1917. F. D. Monckton, Clerk.

No. 683,352

J. C. SWAN.

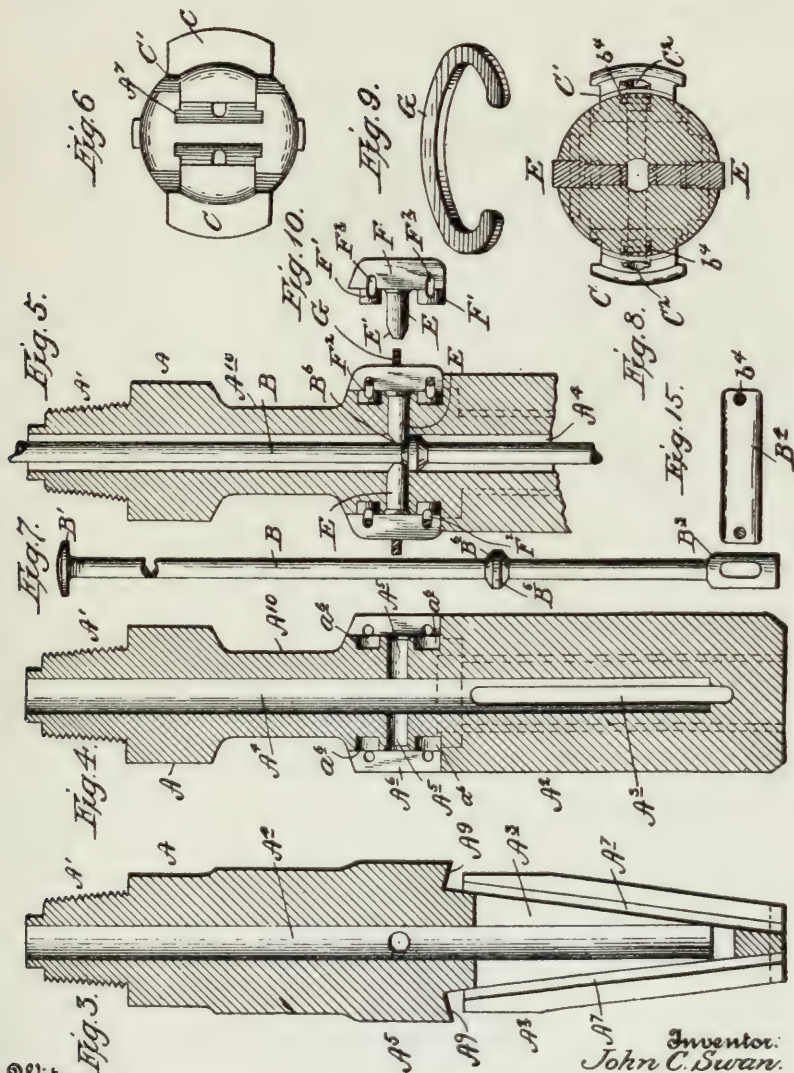
Patented Sept. 24, 1901.

UNDERREAMER

(Application filed Dec. 10, 1900.)

(No Model.)

2 Sheets—Sheet 2.



Witnesses
 Frank L. Curand.
 Grace O. Brecken

Inventor:
 John C. Swan.
 by Stuart & Wesley
 Attorneys.

UNITED STATES PATENT OFFICE.

JOHN C. SWAN, OF MARIETTA, OHIO, ASSIGNOR TO SWAN MACHINE
& TOOL COMPANY, OF SAME PLACE.

UNDERREAMER.

SPECIFICATION forming part of Letters Patent No. 683,352, dated September 24, 1901.

Application filed December 10, 1900. Serial No. 39,404. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. SWAN, a citizen of the United States, residing at Marietta, in the county of Washington, State of Ohio, have invented certain new and useful Improvements in Underreamers, of which the following is a description, reference being had to the accompanying drawings and to the letters of reference marked thereon.

My invention relates to devices for reaming out or enlarging well-holes, and particularly to devices of such character intended for underreaming—that is, reaming out or enlarging the well-hole drilled below a casing in order to permit the casing to be lowered farther down; and my invention consists in the construction and combination of devices for this purpose hereinafter described.

In the drawings, Figure 1 is a perspective view, partly in section, showing the reaming-heads held in contracted position by means of the removable ring. Fig. 2 is a corresponding view showing the reaming-heads in expanded position ready for operation. Fig. 3 is a longitudinal sectional view of the reamer-body. Fig. 4 is a longitudinal sectional view of the reamer-body, taken on a plane at right angles to that on which Fig. 3 is taken. Fig. 5 is a longitudinal sectional view of the same plane as Fig. 4, showing the actuating-rod and trips in position. Fig. 6 is a cross-sectional view showing the reaming-heads in expanded position. Fig. 7 is a detail of the actuating-rod and spring. Fig. 8 is a cross-section on line 8 8 of Fig. 1. Fig. 9 is a detail of the removable ring. Fig. 10 is a detail view of one of the trips. Figs. 11, 12, 13, and 14 are detail views of the reaming-heads, and Fig. 15 is a detail of the pin which carries the reaming-heads.

In the drawings, A is the reamer-body, having at its upper end the screw coupling or pin A' and having its lower end A² wedge-shaped or tapered, as shown. Through the wedge-shaped or tapered portion is formed a slot A³, extending from a point near the lower end of this portion nearly to its upper end. A central bore A⁴ extends from the upper end of the reamer-body nearly to the lower end of the slot. In the sides or housing of the wedge-shaped or tapered portion A² ways

A⁷ are cut. These ways are made substantially dovetailed or wider at their inner ends, as shown at A⁸, in order to receive and retain corresponding extensions on the sides of the reaming-heads C. At the upper ends of the ways A⁷ are arranged abutments A⁹, preferably formed by cutting away the material of the reamer-body at an angle of about nineteen degrees to the horizontal. A short distance above these abutments radial holes A⁵ at right angles to the central bore A⁴ are formed. At the outer ends of these holes A⁵ are formed longitudinal recesses A⁶. Above these recesses is formed the usual tool-square A¹⁰.

In the central bore A⁴ of the reamer-body is arranged the spring-rod B. The rod extends above the upper end of the reamer-body and has a head B' at its upper end. Around the rod, between the head B' and the upper end of the reamer-body, is arranged a coiled spring B². The lower end of the rod B is also provided with a head B³. This head is slotted, as shown, and through it passes a flat pin B⁴. This pin extends radially outward in both directions through the slot A³ and carries at each end a reaming-head C, the reaming-heads being arranged to have free movement on the pin and the pin being arranged to be freely movable in the slot in the head B³. The reaming-heads C are provided with slots C², in which the ends of the pin B⁴ are received. These slots are countersunk at their outer ends, as shown at C³, to receive the heads of rivets b⁴, which are passed through the outer ends of the pin B⁴ and serve to prevent the removal of the reaming-heads from the pin. The outer faces of the reaming-heads are curved, preferably, on the arc of a circle of the diameter to which the well-hole is to be enlarged. The heads are wider at their lower ends than at their upper ends. Their rear portions are made narrower than their faces in order to fit within the ways A⁷ of the reamer-body and are substantially dovetailed in cross-section to fit and be retained by the ways. The upper ends of the reaming-heads are cut at an angle corresponding with the faces of the abutments A⁹, against which they rest when in expanded position, as hereinafter described. The reaming-heads are provided in their outer faces with

683,352

recesses c^4 for the insertion of hooks, by which they may be drawn downward into the position shown in Fig. 1.

Secured to the upper end of the reamer-body by its box D^2 , which screws onto the screw coupling or pin A' , is a spring-case D , having a central longitudinal bore D' of a diameter sufficient to receive the rod B with its spring B^2 . This bore D' extends upward a distance sufficient to permit the rod B to pass freely into it. The bore D' being closed at its upper end forms an air-tight chamber, which in operation will be so far filled with air under pressure as to exclude the water and sediment in which the tool ordinarily works from contact with the spring under ordinary pressures and to expel any water or sediment which may have entered the chamber under extraordinary pressures as the reamer is drawn upward. The spring B^2 , acting against the head B' , forces the rod B , and with it the pin B^4 , upward until the pin reaches the upper end of the slot A^3 . The pin will carry with it in its movement the reaming-heads C , and as these heads move upward they will be caused to move outward by their engagement with the central wedge and with the ways A^7 , cut in the housing or sides of the wedge-shaped or tapered lower portion A^2 of the reamer-body. At the limit of their upward movement the reaming-heads will rest with their upper angular ends in contact with the angular faces of the abutments A^9 . In this position the heads are ready for use. By drawing the reaming-heads downward they are caused to travel inward by reason of their engagement with the ways A^7 of the wedge-shaped or tapered portion A^2 of the reamer-body. The pin B^4 , and with it the spring-rod B , will be drawn downward with the heads until the pin reaches the lower end of the slot A^3 . In order to hold the reaming-heads in this position, I provide the rod B with an obstruction, preferably in the form of a shoulder B^5 , having a beveled upper face e . When the reaming-heads are drawn down as far as possible, this shoulder B^5 is in position to have its beveled face engaged with the tapered ends E' of pins E , which are inserted in the holes A^5 , above described. These pins are preferably integral with trips F , which are perfectly narrow strips of metal fitting the longitudinal recesses A^6 , above described. The angle of the beveled face B^6 of the shoulder B^5 and the taper E' of the pins E is such that if the pins are not positively held against the rod the spring B^2 will cause the bevel B^6 to force the pins outward sufficiently to permit the shoulder to pass the ends of the pins. The trips F are preferably provided on their inner faces with projections F' , which enter recesses a^6 in the reamer-body and are provided with slots F^2 , through which pass pins a^7 . By means of these pins and slots the movement of the trips is guided and at the same time limited. The projections F' and recesses a^6 also aid in guiding

the movement of the trips. It should be understood, however, that the form of the trips may be varied, it being essential only that the trips be capable when held at the limit of their inward movement of holding the pins E with their inner ends against the beveled faces of the shoulder B^5 , and thus preventing the upward movement of the spring-rod. 70 75

In order to insert the tool in the casing of the well, the reaming-heads will be drawn downward, as above described, to the limit of their movement in that direction. This will compress the spring B^2 and bring the shoulder B^5 in position to have its upper face B^6 engaged by the inner ends of the pins E . The pins E are then forced inward by pressure on the trips F , and the trips and pins are temporarily held in position by a removable ring G , made open at one side, as shown in Fig. 9, so that it can be readily slipped into place and removed at the tool-square formed on the reamer-body. The tool is then lowered into the casing. The reaming-heads will enter the casing freely and will pass through it without contact with its interior. The trips F will enter the casing and will be held from outward movement by contact with its interior. The ring G will not enter the casing; but as the tool enters the ring will be pushed upward until it reaches the tool-square, when it may be readily removed. The trips F are preferably rounded at their lower ends, so as to enter the casing readily and to pass any slight obstruction which may be met with as the tool is lowered through the casing. Their upper ends are preferably inclined and rounded, as shown, so as to enter the lower end of the casing when the tool is drawn upward through the casing. As the tool is lowered the reaming-heads, through the action of the interior walls of the casing holding the trips and pins from outward movement, and thus holding the spring-rod from upward movement, will be held out of contact with the interior of the casing, thus avoiding wear on the reaming-heads and possible injury to the casing. It will be understood that it is essential to the successful introduction of the reamer into the casing that the heads be held in this contracted position out of contact with the interior. As soon as the trips pass below the lower end of the casing, which, as will be understood, is elevated a short distance from the shoulder of the small hole to be reamed for the purpose of affording the space necessary for an effective stroke of the reamer, they will be forced outward by the action of the bevel B^6 on the ends of the pins E , the shoulder B^5 will pass the ends of the pins, and the reaming-heads through the action of the spring B^2 will be forced upward on the wedge-shaped or tapered portion A^2 until their upper ends rest against the abutments A^9 . They are then in position for operation. In operation this tool is made a part of the usual string of oil and Artesian well drilling tools. As the tool is raised and 100 105 110 115 120 125 130

allowed to fall, as in the usual operation of drilling, the lower outer edges of the reaming-heads will strike upon the shoulder left below the lower end of the casing and cut it away, thus enlarging or reaming out the hole already drilled to the size desired. The lower end of the portion A² of the reamer-body below the lower edges of the reaming-heads will enter the hole already drilled, and thus serve as a guide for the tool. If, as is often the case, the reaming-heads stick at the point of impact, the lift of the tool will free them by causing them to be drawn inward.

While it should be understood that sufficient metal is left in the tapered or wedge-shaped portion A² to give the necessary strength, the main effect of the impact of the reaming-heads on the material acted on by them is sustained by the abutments A⁹. The force of the impact tends to drive the lower ends of the reaming-heads inward and by a lever action to force the upper ends of these heads outward. This tendency to force the upper ends outward is overcome by forming the abutments A⁹ angular, as shown. The strain is thus taken off the upper portion of the ways A⁷.

In withdrawing the reamer as the tool is drawn upward the lower end of the casing coming in contact with the trips will force them inward, and as the tool is raised farther the end of the casing will cause the reaming-heads to move downward on the inclined portion A² until they are carried inward sufficiently to permit of their entrance within the casing. As the tool is raised through the casing the outer edges of the heads will necessarily be in contact with the interior of the casing.

The ways A⁷ are open at their lower ends, this construction permitting the reaming-heads to be readily removed and replaced, the pin B⁴ preventing the heads from dropping out in operation. The portion of the wedge or taper in which the ways A⁷ are formed is made of sufficient thickness to not only serve as a guide for the tool, as above described, but to also sustain the wear caused by the sidewise movement of the end of the tool in operation and the side blows of the reaming-heads, due to irregularities of the shoulder in hard rock.

It should be understood that the shoulder B⁵ may be of any preferred form, it being essential only that it be of sufficient size to have the beveled upper face B⁶ formed on it.

I prefer to make the reaming-heads in one piece of steel; but it should be understood that they may be made in one or more pieces and may be made part of steel and part of iron, as found most desirable. It should also be understood that I do not desire to be limited to the precise form or precise construction of the several parts of my device as shown and described, it being obvious that many changes may be made without depart-

ing from the essential features of my invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an underreamer, the combination of a reamer-body having a tapered or wedge-shaped portion, a reaming-head arranged to be movable on said tapered or wedge-shaped portion, means for automatically moving the reaming-head to the base or thick end of the tapered or wedge-shaped portion, and means arranged to contact with the interior of the casing for holding the reaming-head at the narrow end of the tapered or wedge-shaped portion during the passage of the tool through the casing; substantially as described.

2. In an underreamer, the combination of a reamer-body, having an oblique face formed thereon, an abutment at the upper end of the oblique face, retaining-ways along the oblique face, a reaming-head arranged to slide on the oblique face and to stop against the abutment, a spring above said abutment, connections between the spring and reaming-head for holding the reaming-head against the abutment and means arranged to contact with the interior of the casing for holding the reaming-head away from the abutment during the operation of lowering the tool through the casing; substantially as described.

3. In an underreamer, the combination of a reamer-body having a tapered or wedge-shaped portion, retaining-ways along the faces of the tapered or wedge-shaped portion, abutments at the upper ends of said faces, reaming-heads arranged to be movable on the tapered or wedge-shaped portion, a spring arranged to automatically move the reaming-heads into contact with said abutments and means arranged to contact with the walls of the well-casing for locking the spring against operation during the passage of the tool through the casing; substantially as described.

4. In an underreamer, the combination of a reamer-body, having a tapered or wedge-shaped lower portion, the lower end of which is adapted to enter the hole to be reamed or enlarged, abutments at the upper end of the tapered or wedge-shaped portion, reaming-heads movable on the tapered or wedge-shaped portion and arranged to stop against said abutments, yielding means for moving the reaming-heads to the wider end of the tapered or wedge-shaped portion into contact with said abutments, means arranged to contact with the interior of the casing for temporarily locking said yielding means against operation to hold the reaming-heads at the narrow end of the tapered or wedge-shaped portion, and means for retaining said locking means in operative position before the tool is inserted in the well-casing; substantially as described.

5. In an underreamer, the combination of a reamer-body, having a tapered or wedge-

shaped lower portion, reaming-heads movable in ways on said tapered or wedge-shaped portion, a rod within the reamer-body having near its lower end a pin extending through a pilot in the reamer-body, and carrying the reaming-heads, a spring arranged to force the rod and with it the reaming-heads, upward into expanded position, pins carried by the reamer-body having their inner ends adapted to engage a shoulder carried by the rod to hold the rod from upward movement, and means for holding the pins in engagement with the shoulder on the rod during the passage of the tool through the well-casing; substantially as described.

6. In an underreamer, the combination of a reamer-body, having a tapered or wedge-shaped lower portion, reaming-heads movable in ways on said tapered or wedge-shaped portion, a rod within the reamer-body having near its lower end a pin extending through a pilot in the reamer-body, and carrying the reaming-heads, a spring arranged to force the rod and with it the reaming-heads, upward into expanded position, pins carried by the reamer-body having their inner ends adapted to engage a shoulder carried by the rod to hold the rod from upward movement, and means adapted to contact with the interior of the casing for holding the pins in engagement with the shoulder on the rod during the passage of the tool through the well-casing; substantially as described.

7. In an underreamer, the combination of a reamer-body having a tapered or wedge-shaped portion provided with ways, reaming-heads carried in said ways, a pin connecting the reaming-heads and movable therein, a longitudinal rod having a shoulder thereon

within the reamer-body, through which the pin passes and is freely movable, means for moving the rod and means engaging the shoulder on the rod and arranged to contact with the interior of the casing for preventing the movement of the rod during the passage of the tool through the well-casing; substantially as described.

8. In an underreamer, the combination of a reamer-body having a tapered or wedge-shaped portion provided with ways, reaming-heads carried in said ways having their upper ends terminating at an oblique angle, and abutments formed on the reamer-body above the ways, having faces arranged at an oblique angle adapted to receive the upper ends of the reaming-heads and yielding means arranged above said reaming-heads for holding them against said abutments; substantially as described.

9. In an underreamer, the combination of a reamer-body having ways formed in its lower portion, reaming-heads carried in said ways, having their upper ends terminating at an oblique angle, and abutments formed on the reamer-body above the ways having their faces arranged at an oblique angle adapted to receive the upper ends of the reaming-heads whereby the force of the blow upon the abutments is directed inward toward the center of the reamer-body and yielding means for holding the reaming-heads against said abutments; substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN C. SWAN.

Witnesses:

GRAFTON L. MCGILL,
A. P. GREELEY.

**Defendant's Exhibit Certified Copy of File Wrapper
and Contents of O'Donnell & Willard U. S.
Patent No. 762,435.**

UNITED STATES OF AMERICA,
DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a true
copy from the Records of this Office of the File
Wrapper and Contents in the matter of the

Letters Patent of

Thomas A. O'Donnell & Arthur G. Willard,
Number 762,435, Granted June 14, 1904,
for

Improvement in Underreamers and Drills.

IN TESTIMONY WHEREOF, I have hereunto
set my hand and caused the seal of the Patent Office
to be affixed at the City of Washington, this 26th day
of November, in the year of our Lord one thousand
nine hundred and twelve and of the Independence of
the United States of America the one hundred and
thirty-seventh.

[Seal]

F. A. TENNANT,
Acting Commissioner of Patents.

[Endorsed]: U. S. Dist. Ct., So. Dist. Cal., So. Div.
In Equity—#1540. Union Tool Co. et al. vs. Wil-
son & Willard Mfg. Co. "Defendant's Exhibit Cer-
tified Copy of File Wrapper and Contents of O'Don-
nell-Willard U. S. Patent No. 762,435." Leo. Long-
ley, Special Examiner. Filed Apr. 16, 1913. Wm.
M. Van Dyke, Clerk. By Chas. N. Williams, Dep-
uty Clerk.

DIV. 38.

NUMBER (SERIES OF 1900). 1899 DIV. 25 38

739712

Div'n ~~XXV~~. 38

8

(EX'R'S BOOK). 223

PATENT No. 762435

Name—Thomas A. O'Donnell & Arthur G. Willard
of Los Angeles

County of

State of California,

Invention—Under-Reamer & Drill,

Division of App., No. 190
PARTS OF APPLICATION FILED.

ORIGINAL.	RENEWED.
Petition	Dec. 8, 1899, 190 , 190
Affidavit	" " " , 190 , 190
Specification	" " " , 190 , 190
Drawing—2 shts.	" " " , 190 , 190
Model or Specimen—None	, 190 , 190
First Fee Cash \$15, Dec. 8, 1899,	190 , 190
" " Cert.	, 190 , 190
Appl. filed complete Dec. 8, 1899,	190 , 190

Examined—A. P. Shaw, Ex. Dec. 7 , 1903 , 190

Countersigned—J. W. Babson , 190

12-8-1903 For Commissioner. For Commissioner.

Notice of Allowance Dec. 9 , 1903 , 190

Final Fee Cash \$20 May 23 , 1904 , 190

2 " " Cert. , 190 , 190

Patented June 14 , 1904

Associate Attorney Attorney—Townsend Bros.

Los Angeles,

California,

Name—Thos. A. O'Donnell &

3 Arthur G. Willard.

Patent No.

Serial Number—739712

Date of Patent

TOWNSEND BROS.
REGISTERED ATTORNEYS

No. 370.

IN THE UNITED STATES PATENT OFFICE.

James R. Townsend Francis M. Townsend

Office: Potomac Block.

Los Angeles, California.

PETITION AND POWER OF ATTORNEY.

TO THE HON. COMMISSIONER OF PATENTS.

Your petitioners Thomas Arthur O'Donnell a citizen of the United States residing at Los Angeles in the County of Los Angeles, State of California and Arthur Gay Willard a citizen of the United States residing at Los Angeles in the county of Los Angeles and State of California, state that their respective post office addresses are 1553 Rockwood St and 1261 West 1st St. Los Angeles Cal and pray that letters patent may be granted to themselves for the ~~improvement in~~ Under Reamer and Drill set forth in the annexed specification, and they hereby appoint the firm of TOWNSEND BROS., the individual members of which firm are James R. Townsend, ~~Alfred I. Townsend~~ and Francis M. Townsend of Los Angeles, California their attorneys with full power of substitution and revocation to prosecute this application, to make alterations and amendments therein, to receive the patent and to transact all business in the PATENT OFFICE connected therewith.

THOS. A. O'DONNELL.

ARTHUR G. WILLARD.

SPECIFICATION:

To All Whom It may Concern

Be it known that We, Thomas Arthur O'Donnell and Arthur Gay Willard, citizens of the United States, residing at Los Angeles, in the County of Los Angeles and State of California, have invented a new and useful UNDER-REAMER AND DRILL, of which the following is a specification.

The object of our invention is to provide an under-reamer and drill which can be readily lowered through a casing smaller than the hole to be drilled and which, in operation, will expand below the casing and will ream out and drill a hole below the casing larger than the casing and which can invariably and without difficulty, be drawn up through the casing whenever it is so desired.

This under-reamer is adapted for use in all kinds of formation and in deep wells, such as oil wells and artesian wells. A difficulty to be avoided in the use of under-reamers is the liability of damaging the shoe or lower end of the casing when it is attempted to ream close to the casing. One object of our invention is to avoid any danger of such injury to the casing when reaming close to the casing; but at the same time providing for the positive locking of the jaws while they are below the casing. It is very important in the operation of under-reamers that the jaws shall be positively locked when they are working underneath the casing so that there shall be no looseness of parts and no liability of the jaws being crowded together or failing to cut.

Another object of our invention is to so construct

the under-reamer that there will be no openings through which dirt can get into the inside of the under-reamer to cause clogging or unnecessary wear.

Another object of our invention is to provide for the absolute automatic operation of the locking and unlocking device so that whenever the reamer passes below the casing it will immediately expand and positively lock and whenever it is drawn upward sufficiently to cause the jaws to engage the casing, the jaws will collapse and pass into the casing without any obstruction.

The accompanying drawings illustrate our invention.

Figure 1 is a fragmental view showing a side elevation of the lower end of our under-reamer as it appears in passing down inside the well-casing. In this view the side of the stock which is at the left in Fig. 4 is shown.

Fig. 2 is a like view showing the under-reamer in operation below the casing. In this view the side of the stock which is at the right in Fig. 4 is shown.

Fig. 3 is a vertical mid-section on line 3—3 Figs. 2, 4 and 5.

Fig. 4 is a vertical mid-section on line 4—4 Figs. 3 and 5.

Fig. 5 is a sectional plan on a plane cutting through the locking-bolt. The plane of this section is indicated by the line 5—5, cutting through the dotted position shown in Figs. 3 and 4.

Fig. 6 is a fragmental perspective detail view showing the interior parts which are detachable from the

stock. A fragment of the stock is shown in vertical mid-section.

Fig. 7 is a like fragmental perspective view illustrating the interior parts in further detail.

1 indicates the stock provided with an upwardly tapering frusto conical socket 2 in its lower end, which socket is practically formed into two tapering sockets by a vertically slotted wedge shape partition 3 extending across the socket 2 of the stock and fitted at its opposite edges to the socket and provided with a transverse slot 4. The upper end of the partition 3 is screw-threaded as at 5 and screwed into the stock. 6 indicates a way through the upper end of the partition leading from the slot 4 into a spring chamber 7 provided in the stock above the partition. 8 indicates a cross-head in the slot and provided with a stem 9 extending through the way 6 into the spring chamber. 10 indicates the spring in the spring chamber for normally holding the stem up. 11 indicates nuts on the upper end of the stem to rest upon the spring. 12 indicates a jaw member provided with a tapering shank 13 to fit in one of the tapering shank-sockets formed between the partition 3 and the wall of the tapering socket 2 in the end of the stock. The shank 13 is provided with a cross-head-socket 14 in the extended plane of the slot 4 of the partition. The jaw-member is provided with a shoulder 15 to fit against the lower end of the stock when the shank is fully seated in the tapering socket. 12' indicates a like jaw-member provided with the shank 13', cross-head-socket 14' and shoulder 15'; and said jaw-member 12' is arranged with its shank in the other

socket formed therefor between the partition 3 and the wall of the tapering socket 2. The cross-head 8 is arranged to play in the slot 4 and its opposite ends are inserted in the cross-head-sockets 14 14' so that the two jaw-members are carried by the spring 10 through the medium of the stem and cross-head. 16 indicates a spring-pressed bolt normally extending across the slot 4 in the path of the cross-head 8 to lock the cross-head against lowering. In Fig. 3 the normal locking position of this bolt is indicated in dotted lines at the lower end of the view. The outer end of the bolt is provided at its upper side with a bevelled face 17 which is normally chambered in a portion of the bolt-hole 18 which extends through the partition and through the stock, being closed at one end by a screw-plug 19. 20 indicates a spring in the bolt-hole to normally hold the bolt 16 normally inserted across the slot 4 with its bevelled portion 17 fully beyond the slot. 21 indicates a bolt-retracting pin mounted in the bolt-hole and normally projecting from the side of the stock to be engaged and thrown by the well-casing 22 to bring the bolt 16 into position shown in solid lines in Fig. 4 with the bevelled face 17 of the bolt in the path of the cross-head 8. The cross-head 8 has a bevelled face 23 to engage the bevelled face 17 of the bolt when the bolt is in its retracted position shown in solid lines in Fig. 4.

The spring 10 is of sufficient strength to normally hold the jaws 12 12' in their updrawn position with their shanks fully seated in the socket therefor. The bolt-hole 18 is larger at the end which is closed with

the plug 19 than at the opposite end; and shoulders 24 and 25 are provided to respectively prevent the bolt and the bolt-retracting pin from being thrown too far by the force of the bolt-spring 20. Preferably the bolt 16 is provided with a chamber 26 to seat one end of the spring 20, and the spring-holding plug 19 is provided with a like chamber 27 to seat the other end of the spring 20.

For convenience in assembling the parts the cross-head-stem 9 is made of two parts, one of which, *a*, is integral with the cross-head and the other, *b*, is screwed to the part *a*. The part *a* of the stem, together with the cross-head, are of less length than the slot 4 and said stem is of greater length than the way 6 so that the part *a* and cross-head 8 can be inserted into the slot and the section *a* then pushed up through the way 6; then the section *b* of the stem 8 is screwed onto the section *a*; after which the spring is placed in position and the nuts 11 screwed down into place to give the appropriate tension to the spring which rests upon the upper end of the partition 3. Then the jaws 12 12' are placed against the sides of the partition with their sockets 14 14' caught over the ends of the cross-head 8, and the parts thus assembled are inserted into the conical socket 2 and turned to screw the screw-threaded upper end of the partition into the screw-threaded part therefor in the stock. 28 indicates a screw inserted through the stock and screwed into the partition to prevent the partition from unscrewing.

After the parts have thus been assembled the bolt

Oct. 30,
1900
and guideway

retracting-pin 21 is inserted into the bolt-hole A 18. Then the bolt 16 is inserted into the bolt-hole 18, and the spring 20 is brought into place and the plug 19 screwed home. The tool is then in condition for operation.

In practical operation in order to start the tool down into the well through the casing 22, the workman will first push the bolt-retracting pin 21 in into the position indicated in solid lines in Fig. 4, and then will draw the jaws 12 12' down into the position indicated in Fig. 1. Then the tool will be let down into and allowed to pass through the casing. It is to be observed in Figs. 1 and 4 that the jaws are rounded as at 29 so that the cutting edge of the jaws are in-turned when the jaws are in their down-drawn position, so that the cutting edges will not touch the casing during the decent of the tool.

When the tool has passed beyond the shoe 22' of the casing, the spring 10 draws the cross-head up, thus drawing the bits up into their socket in the stock, the jaws engaging the walls of the well will be held thereby sufficiently so that the downward stroke of the stock assists the action of the spring to seat the jaw-shanks firmly in their sockets, thus bringing the shoulders 15 15' to fit firmly against the end of the stock. The spring 20 throws the bolt 16 and the pin 21 so that the bevelled face 17 of the bolt is chambered in the partition and the cross-head is thus effectually locked against drawing out of the stock on the up-stroke of the stock.

Whenever the tool is draws upward so far that the pin 21 is again forced in by the shoe 22' of the casing,

the bolt is thrown into its unlocking position so that when the shoulders 15 15' of the jaws engage with the shoe 22', the cross-head is free to slip in the stock, thus to allow the stock to be drawn up while the jaws collapse into the position indicated in solid lines in Fig. 1 and in dotted lines in the upper position in Fig. 3. The tool can therefore be readily drawn out through the casing and can be lowered and raised at pleasure and whenever it is below the casing it is ready for effective operation as before described.

The partition 3 is flat faced and holds the jaws spread apart when the shanks are fully seated in the shank-sockets.

The ends of the cross-head have sufficient play in their sockets to allow the jaws to swing freely toward each other as the shanks withdraw from the shank-sockets.

The bolt and its retracting-pin are to be located as close as possible to the shoulders and the cutting-edges of the jaws so that the jaws may become locked as soon as possible after passing below the lower end of the casing and will work in locked position very close to the bottom of the casing, and yet will always be fully unlocked before the shoulders can injure the bottom of the casing on an up-stroke.

What we claim and desire to secure by letters-patent of the United States is:

1. An under-reamer comprising a stock provided with two tapering sockets in its lower end, a vertically slotted wedge-shape partition between the sockets, and having bolt-holes opening from the slot axially in line with each other below the top of such sockets, such stock being also provided with a spring-

chamber above the partition; a jaw-member provided with a tapering shank to fit in one of said sockets, and also provided with a shoulder to fit against the lower end of the stock when the tapering shank is seated in its socket, said shank being provided with a cross-head socket in the extended plane of said slot; a like jaw-member having its shank seated in the other socket of the stock; a cross-head to play in the slot and having its opposite ends seated in the sockets of the shanks, respectively, and having a stem extending up into the spring-chamber; a spring in said chamber for normally holding up the stem, cross-head and jaws; a spring-pressed bolt normally extending across the slot in the path of the cross-head to lock the cross-head against lowering, said bolt having at the upper side of its end a bevelled portion normally chambered in the partition; a spring for normally holding the bolt in its locking position; and a bolt-retracting pin mounted in the bolt-hole and normally projecting from the side of the stock to be thrown by the well-casing to bring the bolt into position with the bevelled portion of the bolt in the path of the cross-head.

2. The combination of a stock provided with a tapering socket in its lower end and with a spring-chamber above said socket and with a screw-threaded portion between said spring-chamber and said socket; a wedge-shape partition fitted in the socket of the stock and provided with a transverse slot and screwed into the stock and provided with a way leading from the slot through the upper end of the partition; a cross-head in the slot and provided with a stem extending the way into the spring-chamber; a spring in

the spring-chamber for normally holding the stem up; two jaw-members carried by the cross-head on the opposite sides of the partition and each provided with a tapering shank to fit the stock-socket on opposite sides of the partition and also provided with a shoulder to engage the lower end of the stock when the shanks are seated in their sockets in the stock; a spring-pressed bolt to play across the slot in the partition and provided with a bevelled portion at the upper side and outer end; and a bolt-retracting pin mounted in the stock and normally projecting from the side of the stock to be thrown by the well-casing to bring the bolt into position with the bevelled portion of the bolt in the path of the cross head.

3. In an under-reamer, the combination with a ^{having a transverse guideway} jaw-carrying head Λ of a locking-bolt for the head ^{in said guideway} Λ a spring for holding the bolt in locking position; ^{sliding in said guideway coaxial of the bolt} and a bolt-retracting pin Λ to engage the well-casing to retract the bolt.

4. An under-reamer-stock provided with a socket in its lower end and a partition fastened in the socket to form two shank-seating sockets to seat the shanks of two jaws on opposite sides of said partition.

5. An under-reamer comprising a stock, the lower end of which has two upwardly tapering shank-seating sockets with a flat faced downwardly tapering partition between said shank-seating sockets; jaws respectively provided with shanks to fit in said sockets; and means for yieldingly holding the jaws in place with their shanks seated in said sockets.

IN TESTIMONY WHEREOF we have signed our names to this specification in the presence of two subscribing witnesses, at Los Angeles, California, this 28th day of November, 1899.

Inventors:

THOS. A. O'DONNELL.

ARTHUR G. WILLARD.

Witnesses:

JAMES R. TOWNSEND.

FRANCIS M. TOWNSEND.

OATH.

STATE OF CALIFORNIA,
COUNTY OF LOS ANGELES,—ss.

Thomas Arthur O'Donnell and Arthur Gay Willard the above-named petitioners, being duly sworn (or affirmed) depose and say that they verily believe themselves to be the original, first and joint inventors or discoverers of the ~~improvement in~~ Under-Reamer and Drill described and claimed in the annexed specification; that they do not know and do not believe that the same was ever known or used before their invention or discovery thereof; or patented or described in any printed publication in any country before their invention or discovery thereof or more than two years prior to this application; or in public use or on sale in the United States for more than two years prior to this application, and that no application for patent on said improvement has been filed

Legal representatives or assigns

by them or their ~~representatives~~ in any foreign country, except as follows:

And said Thomas Arthur O'Donnell states that he

is a citizen of the United States and resident of Los Angeles in the County of Los Angeles and State of California.

And said Arthur Gay Willard states that he is a citizen of the United States and resident of Los Angeles in the County of Los Angeles and State of California.

And said — states that he is a citizen of — and resident of — in the County of — and State of —. And said — states that he is a citizen of — and resident of — in the County of — and State of —.

THOS. A. O'DONNELL.

ARTHUR G. WILLARD.

Sworn to and subscribed before me this 28th day of November, 1899.

[Seal]

L. C. BECKER,

Notary Public in and for the County of Los Angeles,
State of California.

Serial No. 739,712. Paper No. 1/2. APPLICATION. Filed Dec. 8, 1899. O'Donnell & Willard.

U. S. PATENT OFFICE. DEC. 8, 1899.
CHIEF CLERK.

Paper No. —.

All communications respecting this application should give the serial number, date of filing, and title of invention.

Div. — Room No. 243.

Address only

“The Commissioner of Patents,
Washington, D. C.”

DEPARTMENT OF THE INTERIOR.
UNITED STATES PATENT OFFICE.

Washington, D. C., Jan. 6, 1900.

MAILED, “ “ “

O'Donnell & Willard,
Care Townsend Bros.,
Los Angeles, California.

Please find below a communication from the
EXAMINER in charge of your application.

#739,712, filed Dec. 8, 1899, for Under-Reamer and
Drill.

C. H. DUELL,
Commissioner of Patents.

Claims 1 and 2 will be allowed, as at present advised.

Claim 3 is rejected upon reference to 414,411, Herberg, Nov. 5th, 1889—Artesian & Oil Wells; Reamers. See, for a further view of the prior art, 294,302, Allen, Feb. 26th, 1884—same sub-class, and 634,941, Hall, Oct. 17th, 1899—Reamers.

LEWIS B. WYNNE,
Examiner, Division.

XXV.

A. McN.

Serial No. 739,712. Paper No. 1. Exrs. Letter Rejection. Dated Jan. 6, 1900. O'Donnell and Willard.

ROOM 243.

DIV. 25.

TOWNSEND BROS.

Registered Attorneys.

No. 370.

IN THE UNITED STATES PATENT OFFICE.

James R. Townsend, ~~Alfred I. Townsend~~, Francis
M. Townsend.

Office 9 Downey Block.

Los Angeles, Cal., Oct. 3, 1900. 189

O'Donnell & Willard,

Under Reamer and Drill,

Filed Dec. 8, 1899, S. No. 739,712.

18 No.

Commissioner of Patents,

Sir: Examiner's letter of Jan. 6, 1900, and the patents cited have been considered.

We request reconsideration of claim 3, for the reason that the patent does not show any bolt-retracting pin for retracting the bolt 16.

In order to make this claim clearer we amend the
specification as follows:

Page 5, line 4, after "bolt-hole" insert and guide-
way.

Claim 3, line 2, before the comma insert having a

128 *Wilson & Willard Manufacturing Company*
transverse guideway. Before the semicolon insert
in said guideway.

Line 3, after "pin" insert sliding in said guideway
coaxial of the bolt.

The application now appears to be in condition
for issue.

Very respectfully,
TOWNSEND BROS.
Attorneys for O'Donnell & Willard.

JRT.
W.

Serial No. 739,712, Paper No. 2. Amendment.
Filed Oct. 30, 1900. O'Donnell and Willard.

U. S. Patent Office. Oct. 29, 1900. Chief Clerk.
United States Oct. 30, 1900. Patent Office. Patent
Office Oct. 31, 1900. Division XXV.

Paper No. —.

All communications respecting this application
should give the serial number, date of filing, and
title of invention.

Div. — Room No. 243.

Address only

"The Commissioner of Patents,
Washington, D. C."

DEPARTMENT OF THE INTERIOR.
UNITED STATES PATENT OFFICE.

Washington, D. C., Nov. 26, 1900.

MAILED " " "

O'Donnell & Willard,
Care Townsend Bros.,
Los Angeles, California.

Please find below a communication from the EXAMINER in charge of your application.

#739,712, filed Dec. 8, 1899, for Under-Reamer and Drill.

C. H. DUELL,
Commissioner of Patents.

Case as amended Oct. 30th, 1900, considered.

The 3d claim is undoubtedly devoid of patentable novelty in view of Herberg, before cited, and it is therefore again rejected thereon. Said claim is also anticipated in 381,124, Gail, April 17th, 1888—Artesian & Oil Wells; Reamers.

The 4th claim is rejected in view of 634,941, Hall, Oct. 17th, 1899; or British patent 10,225, of 1896, to Tarbini—same subclass. See, also, 48,388, Fisher, June 27th, 1865, and 111,265, Shoemaker, Jan. 24th, 1871—Stone Working; Drills (D).

The 1st and 2d claims have been allowed, and the 5th probably will be.

A. McNAUGHT,
Act'g Examiner, Div. XXV.

Serial No. 739,712, Paper No. 3. Exrs. Letter. Rejn. Dated Nov. 26, 1900. O'Donnell and Willard.

130 *Wilson & Willard Manufacturing Company*

ROOM 243.

DIV, 25.

MAILED

NOV. 14, 1901.

Townsend Bros.

TOWNSEND BROS.

Registered Attorneys.

No. 370.

IN THE UNITED STATES PATENT OFFICE.

O'Donnell & Willard,

Under Reamer and Drill,

Filed Dec. 8, 1899, S. No. 739,712.

Dated — No. —.

Los Angeles, Cal. Nov. 14, 1901, 190

Commissioner of Patents,

Sir: Examiner's letter of Nov. 26, 1900, and the patents cited have been considered.

We amend as follows:

Re-write claims 3 and 4 to read as follows:

A "3. In an under-reamer, the combination with a jaw-carrying head having a transverse guideway, of a locking-bolt for said head arranged in said guideway; a pin sliding in said guideway to retract the bolt to unlock the head; a stop for said pin being provided in the guideway; and a spring to normally press the bolt toward the stop and into locking position, and to project the pin from the head to be returned by contact with the casing.

per C 4. An under-reamer-stock provided with a socket downwardly tapering partition rigidly fixed in its lower end; a slotted, A ~~partition fastened~~ in the socket to form two shank-seating sockets to seat the shanks of two jaws on opposite sides of said partition; a jaw on each side of said partition per D tion; A and a jaw-carrying head moving in the slot of said partition."

Insert

B

Dec. 28/01.

It is thought the foregoing amendment is self-explanatory and that the application may now be passed for issue.

Very respectfully,

TOWNSEND BROS.

Attorneys for O'Donnell & Willard.

JRT—W.

Serial No. 739,712, Paper No. 4. Amendment A.
Filed Nov. 19, 1901. O'Donnell and Willard.

Patent Office. Nov. 21, 1901. Division XXV.
Mail Room. Nov. 19, 1901. U. S. Patent Office.

A. B. S.

Paper No. —.

All communications respecting this application should give the serial number, date of filing, and title of invention.

Div.—, Room No. 243.

Address only

“The Commissioner of Patents,
Washington, D. C.”

DEPARTMENT OF THE INTERIOR.
UNITED STATES PATENT OFFICE.

Washington, D. C., Dec. 3, 1901.

MAILED “ “ “

O'Donnell & Willard,
c/o Townsend Bros.,
Los Angeles, California.

Please find below a communication from the
EXAMINER in charge of your application.

#739,712, filed Dec. 8, 1899, for Under-Reamer and Drill.

F. I. ALLEN,
Commissioner of Patents.

Case considered as amended Nov. 19, 1901.

The 3d claim will be allowed, as at present advised.

The 4th claim is destitute of patentable novelty in view of 460,444, McGregory, Sept. 29, 1891—Artesian & Oil Wells; Reamers, and it is therefore rejected. See, also, 434, 241, Bowe, Aug. 12, 1890—same sub-class.

The remaining claims stand allowed.

LEWIS B. WYNNE,
Examiner,

A. McN. Division XXV.

Serial No. 739,712, Paper No. 5. Exrs. Letter Rejection. Dated Dec. 3, 1901. O'Donnell and Willard.

ROOM 243.

DIV. 25.

TOWNSEND BROS.
Registered Attorneys.
No. 370.

IN THE UNITED STATES PATENT OFFICE.

O'Donnell & Willard,
Under-Reamer and Drill,
Filed Dec. 8, 1899, S. No. 739,712.
Dated — No. —.

Los Angeles, Cal., Dec. 23, 1901. 190
Commissioner of Patents,

Sir: Examiner's letter of Dec. 3, 1901, and the patents referred to have been considered.

We request reconsideration and allowance of claim 4, for the reason that McGregory does not show the socket in the stock, and Bowe does not show any partition and the two patents taken together do not show applicants' idea of means set forth in the claim.

Add the following claim:—

“6. An under-reamer comprising a stock provided with a socket in its lower end; a ^{stationary} Λ slotted partition ^{and extending from side to side thereof} fastened in the socket Λ to form two shank-seating-sockets to seat the shanks of two jaws on opposite sides of said partition; a jaw-carrying head moving in the slot of said partition; means for yieldingly holding said head up; and jaws carried by said head and having shanks seated in said sockets.”

The foregoing claim appears to be so clearly allowable over the patents referred to that further remark is deemed unnecessary.

We trust the application may now be passed for issue.

Very respectfully,

TOWNSEND BROS.,

Attorneys for O'Donnell and Willard.

JRT—W.

Serial No. 739,712, Paper No. 6. Amendment B.
Filed Dec. 28, 1901. O'Donnell and Willard.

Patent Office. Dec. 31, 1901. Division XXV.
Mail Room. Dec. 28, 1901. U. S. Patent Office.

M. E. C.

Paper No. —.

All communications respecting this application should give the serial number, date of filing, and title of invention.

Div. —, Room No. 243.

Address only

“The Commissioner of Patents,
Washington, D. C.”

DEPARTMENT OF THE INTERIOR.
UNITED STATES PATENT OFFICE.

Washington, D. C., Feb. 19, 1902.

Mailed “ “ “

T. A. O'Donnell, and A. G. Willard,
Care Townsend Bros.,
Los Angeles, California.

Please find below a communication from the EXAMINER in charge of your application.

#739,712, filed Dec. 8, 1899, for Under-Reamer and Drill.

F. I. ALLEN,
Commissioner of Patents.

Case considered as amended Dec. 28, 1901.

The 4th claim is again rejected as destitute of patentable novelty in view of either *Bowe* (434,241) or *McGregory* (460,444) before cited. Said claim is also anticipated in 679,384, *Kellerman*, July 30, 1901, *Artesian and Oil Wells, Reamers*, application filed July 30, 1899.

The 5th and 6th fail to define patentable novelty

in view of the above-cited references, and they are accordingly rejected.

The remaining claims stand allowed.

LEWIS B. WYNNE,

Examiner.

A McN.

Serial No. 739,712. Paper No. 7. Exrs. Letter
Rejn. Dated Feb. 19, 1902. O'Donnell and Willard.

ROOM 243.

739,712, Paper No. 8.

DIV. 90.

Amdt. C.

MAILED

DEC. 9, 1902.

Townsend Bros.

TOWNSEND BROS.

Registered Attorneys.

430-431-432-433 BRADBURY BLOCK,

304-306 S. Broadway.

No. 370.

IN THE UNITED STATES PATENT OFFICE.

T. A. O'Donnell and A. G. Willard,

Under-Reamer and Drill.

Filed Dec. 8, 1899. S. No. 739,712.

Dated No.

Los Angeles, Cal., Dec. 9, 1902. 190

Hon. Commissioner of Patents,

Sir: Examiner's letter of Feb. 19, 1902, and the
patents referred to have been considered.

We amend as follows:—

Claim 4, line 2, insert a comma after “slotted” and
change “partition fastened” to—downwardly taper-
ing partition rigidly fixed—.

Rewrite claim 5 as follows:—

C¹

—5. An under-reamer comprising a stock, the lower end of which has two upwardly tapering shank-seating sockets with a flat faced downwardly tapering partition rigidly fixed between said shank-seating sockets; a vertically movable cross-head in the slot of the partition; shouldered jaws carried by said cross-head; and an upwardly tapering shank for each socket.—

Claim 6, line 2, before “slotted” insert—stationary—. Line 3, after “socket” insert—and extending from side to side thereof—.

Add the following claim:

C²

—7. An under-reamer comprising a stock provided with a plurality of tapering sockets in its lower end; a stationary, vertically slotted partition separating the sockets; a jaw-member; a tapering shank for said jaw-member, said shank being provided with a cross-head socket in the extended plane of said slot; a like jaw-member having its shank seated in an opposite socket of the stock; a cross-head to play in the slot and having opposite ends seated in the socket of the shanks, respectively, and having an upwardly extending stem, means for yieldingly holding up the stem cross-head and jaws; a spring-pressed bolt normally extending across the slot in the path of the cross-head to lock the cross-head against lowering, said bolt having at its upper end a beveled portion; a spring for normally holding the

bolt in its locking position; and means adapted to be engaged by the well-casing to bring the bolt into position with the beveled portion thereof in the path of the cross-head.—

We believe the foregoing amendment places the case in condition meriting favorable action.

Very respectfully,

TOWNSEND BROS.,

Attys. for O'Donnell & Willard.

JRT.—A.

ALBERT H. MERRILL.

Mail Room. Dec. 15, 1902. U. S. Patent Office.
U. S. Patent Office. Dec. 16, 1902. Division XXV.
U. S. Patent Office. Dec. 16, 1902. Division 38.

LC.

Paper No. 9.

All communications respecting this application should give the serial number, date of filing, and title of invention.

Div. —, Room No. 222.

Address only

“The Commissioner of Patents,
Washington, D. C.”

DEPARTMENT OF THE INTERIOR.
UNITED STATES PATENT OFFICE.

Washington, D. C., January 3, 1903.

Mailed “ “ “

O'Donnell & Willard,

Care Townsend Bros.,

Bradbury Block,

Los Angeles, California.

138 *Wilson & Willard Manufacturing Company*

Please find below a communication from the EXAMINER in charge of your application for "Under Reamer and Drill," filed December 8, 1899, Serial No. 739,712.

F. I. ALLEN,
Commissioner of Patents.

In response to the communication filed December 15, 1902:

Claim 4 is rejected as being incomplete. The claim should include the jaws. As they are now directly referred to, they should be positively included to make an operative device.

Claims 1, 2, 3, 5, 6, and 7, are considered allowable.

A. P. SHAW, Ex.

MEP.

Paper #10.

MAIL ROOM.

739,712, Paper No. 10.

NOV. 9, 1903.

Amdt. D.

U. S. PATENT OFFICE.

MAILED

NOV. 3, 1903.

Townsend Bros.

U. S. Patent Office.

ROOM 222.

NOV. 9, 1903.

DIV. 38.

DIVISION 38.

TOWNSEND BROS.

Registered Attorneys.

430-431-432-433 Bradbury Block,

304-306 S. Broadway.

No. 370.

IN THE UNITED STATES PATENT OFFICE.

O'Donnell & Willard,

Under-Reamer and Drill.

Filed Dec. 8, 1899. S. No. 739,712.

Dated No.

Los Angeles, Cal., Nov. 3, 1903. 190

Hon. Commissioner of Patents,

Sir: In response to Examiner's letter dated Jan. 3, 1903, we amend as follows:—

Claim 4, line 4, before "and" insert—a jaw on each side of said *partion*;—

Final allowance is now believed to be in order.

Very respectfully,

TOWNSEND BROS.,

Attorneys for O'Donnell et al.

FMT.

A. H. MERRILL.

M.

TOWNSEND BROS.

Registered Attorneys.

No. 370.

IN THE UNITED STATES PATENT OFFICE.

James R. Townsend

Francis M. Townsend

~~Alfred I. Townsend~~

430-431-432-433 (Opposite City Hall) Broadway,

Bradbury Block, 304-306 S. Broadway.

\$20— RECEIVED

ck MAY 23, 1904. Z.

CHIEF CLERK. U. S. PATENT OFFICE.

Thomas O'Donnell & A. G. Willard,

Under Reamers.

Filed Dec. 8, 1899. S. No. 739,712.

Allowed Dec. 9, 1903. No.

140 *Wilson & Willard Manufacturing Company*

Los Angeles, Cal., May 17, 1904. 189
Commissioner of Patents.

Sir: We herewith hand you ^{in our check} U. S. ~~Certificate of~~
~~Deposit~~ for \$20.00 final Government Fee in the mat-
ter of the above-mentioned application. Please
issue the patent as per record.

Very respectfully,
TOWNSEND BROS.

CERTIFICATE.

AMOUNT RECEIVED.

\$15.00.

CHIEF CLERK.

TOWNSEND BROS.

Registered Attorneys.

No. 370.

IN THE UNITED STATES PATENT OFFICE.

James R. Townsend Francis M. Townsend

~~Alfred I. Townsend~~

OFFICE 9 DOWNEY BLOCK

321-322-323-324, Potomac Block (Opposite City
Hall), Broadway.

Thomas Arthur O'Donnell & Arthur Gay Willard,
Under-Reamer and Drill.

Application sworn Nov. 28, 1899.

Los Angeles, Cal. Dec. 2, 1899. 189
Commissioner of Patents.

Sir: We herewith enclose Petition and Power of
Attorney, Specification, Oath, and 2 sheets of Draw-
ings in the matter of the above-mentioned Applica-

tion for Patent. Also U. S. Certificate of Deposit covering \$15.00 Filing Fee.

Very respectfully,
TOWNSEND BROS,

JRT. per H. R.
W.

U. S. PATENT OFFICE. DEC. 8, 1899. CHIEF
CLERK.

ivision.

ons should be addressed to
mmissioner of Patents,
Washington, D. C."

Serial No. 739,712.

DEPARTMENT OF THE INTERIOR.

U. S. PATENT OFFICE,

Washington, D. C., Dec. 9, 1903.

Thomas A. O'Donnell and

Arthur G. Willard,

c/o Townsend Bros.,

Los Angeles, Cal.

Sir: Your APPLICATION for a patent for an
IMPROVEMENT IN

Under-reamers and Drills,

Filed Dec. 8, 1899, has been examined and AL-
LOWED.

The final fee, Twenty Dollars, must be paid, and
the Letters Patent bear date as of a day not later
than SIX MONTHS from the time of this present
notice of allowance.


patent will be withheld, and your only relief will be by a renewal of the application, with additional fees, under the provisions of Section 4897, Revised Statutes. The Office aims to deliver patents upon the day of their date, and on which their term begins to run; but to do this properly applicants will be expected to pay their final fees at least **TWENTY DAYS** prior to the conclusion of the six months allowed them by law. The printing, photolithographing, and engrossing of the several patent parts, preparatory to final signing and sealing, will consume the intervening time, and such work will not be done until after payment of the necessary fees.

When you send the final fee you will also send, **DISTINCTLY AND PLAINLY WRITTEN**, the name of the **INVENTOR** and **TITLE OF INVENTION AS ABOVE GIVEN**, **DATE OF ALLOWANCE** (which is the date of this circular), **DATE OF FILING**, and, if assigned, the **NAMES OF THE ASSIGNEES**.


If you desire to have the patent issue to **ASSIGNEES**, an assignment containing a **REQUEST** to that effect, together with the **FEE** for recording the same, must be filed in this Office on or before the date of payment of final fee.


After issue of the patent uncertified copies of the drawings and specifications may be purchased at the price of 5 cents each. The money should accompany the order. Postage stamps will not be received.

Respectfully,
F. I. ALLEN,
Commissioner of Patents.

 After allowance, and prior to payment of the final fee, applicants should carefully scrutinize the description to see that their statements and language are correct, as mistakes not incurred through the fault of the office, and not affording legal grounds for reissues, will not be corrected after the delivery of the letters patent to the patentee or his agent.

[Written across face and in margin:]

 IN REMITTING THE FINAL FEE GIVE THE SERIAL NUMBER AT THE HEAD OF THIS NOTICE.

 If payment is made by check or draft, the credit allowed is subject to the collection of the same.

Issue and Gazette Division. Serial No. 739,712

All communications should be addressed to

“The Commissioner of Patents,
Washington, D. C.”

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE,

Washington, D. C., May 23, 1904.

Thomas A. O'Donnell & Arthur G. Willard,

C/o Townsend Bros.,

Los Angeles, Cal.

Sir: Your application for a patent for an IMPROVEMENT IN

Underreamers and Drills.

filed Dec. 8, 1899, ~~190~~, has been examined and again ALLOWED.

The final fee, TWENTY DOLLARS, in the above-entitled case was received May 23, 1904.

Very respectfully,

F. I. ALLEN,

Commissioner of Patents.

No. 762,435.

PATENTED JUNE 14, 1904

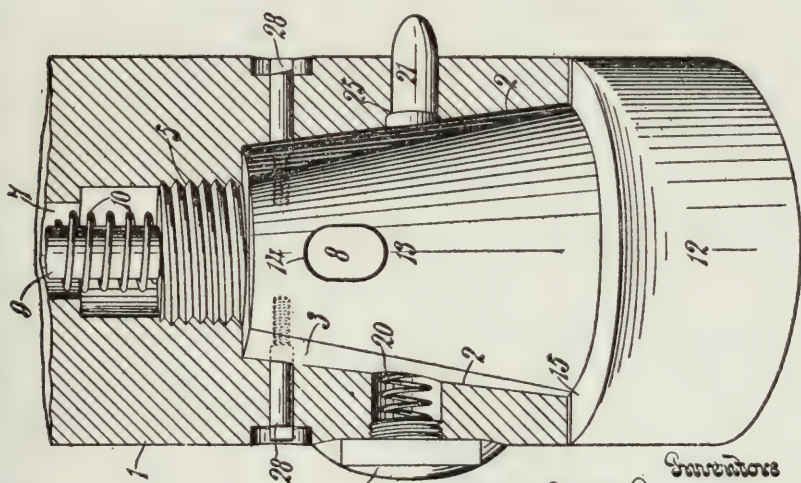
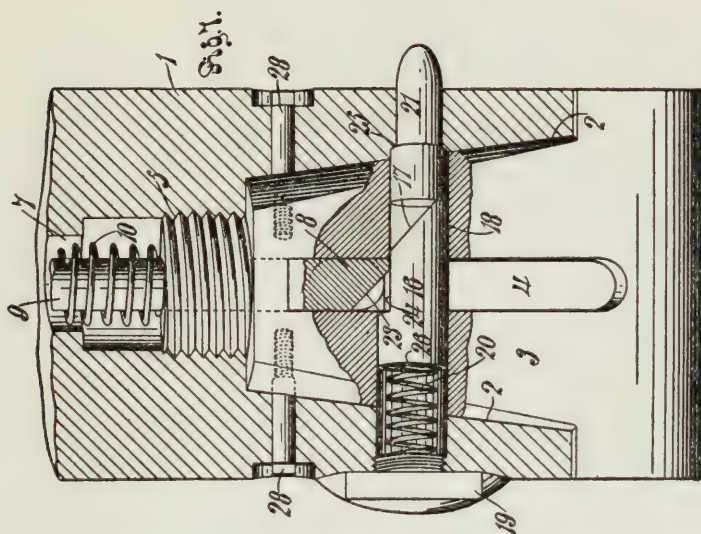
T. A. O'DONNELL & A. G. WILLARD.

UNDERREAMER AND DRILL.

APPLICATION FILED DEC 8 1899

NO MODEL.

2 SHEETS—SHEET 2



Witnesses
Seymour
J. Townsend.

Fig. 2.

Inventors
Thos. A. O'Donnell
Arthur G. Willard
By Townsend Bros.
Law Attys

UNITED STATES PATENT OFFICE.

THOMAS A. O'DONNELL AND ARTHUR G. WILLARD, OF LOS ANGELES, CALIFORNIA.

UNDERREAMER AND DRILL.

SPECIFICATION forming part of Letters Patent No. 762,435, dated June 14, 1904.

Application filed December 8, 1899. Serial No. 739,712. (No model.)

To all whom it may concern:

Be it known that we, THOMAS ARTHUR O'DONNELL and ARTHUR GAY WILLARD, citizens of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, having invented a new and useful Underreamer and Drill, of which the following is a specification.

The object of our invention is to provide an underreamer and drill which can be readily lowered through a casing smaller than the hole to be drilled and which in operation will expand below the casing and will ream out and drill a hole below the casing larger than the casing and which can invariably and without difficulty be drawn up through the casing whenever it is so desired. This underreamer is adapted for use in all kinds of formation and in deep wells, such as oil-wells and Artesian wells. A difficulty to be avoided in the use of underreamers is the liability of damaging the shoe or lower end of the casing when it is attempted to ream close to the casing.

One object of our invention is to avoid any danger of such injury to the casing when reaming close to the casing, but at the same time providing for the positive locking of the jaws while they are below the casing. It is very important in the operation of underreamers that the jaws shall be positively locked when they are working underneath the casing, so that there shall be no looseness of parts and no liability of the jaws being crowded together or failing to cut.

Another object of our invention is to so construct the underreamer that there will be no openings through which dirt can get into the inside of the underreamer to cause clogging or unnecessary wear.

Another object of our invention is to provide for the absolute automatic operation of the locking and unlocking device, so that whenever the reamer passes below the casing it will immediately expand and positively lock, and whenever it is drawn upward sufficiently to cause the jaws to engage the casing the jaws will collapse and pass into the casing without any obstruction.

The accompanying drawings illustrate our invention.

Figure 1 is a fragmental view showing a side elevation of the lower end of our underreamer as it appears in passing down inside the well-casing. In this view the side of the stock which is at the left in Fig. 4 is shown. Fig. 2 is a like view showing the underreamer in operation below the casing. In this view the side of the stock which is at the right in Fig. 4 is shown. Fig. 3 is a vertical mid-section on line 3 3, Figs. 2, 4, and 5. Fig. 4 is a vertical mid-section on line 4 4, Figs. 3 and 5. Fig. 5 is a sectional plan on a plane cutting through the locking-bolt. The plane of this section is indicated by the line 5 5, cutting through the dotted position shown in Figs. 3 and 4. Fig. 6 is a fragmental perspective detail view showing the interior parts, which are detachable from the stock. A fragment of the stock is shown in vertical mid-section. Fig. 7 is a like fragmental perspective view illustrating the interior parts in further detail.

1 indicates the stock, provided with an upwardly-tapering frusto-conical socket 2 in its lower end, which socket is practically formed into two tapering sockets by a vertically-slotted wedge-shape partition 3, extending across the socket 2 of the stock and fitted at its opposite edges to the socket and provided with a transverse slot 4. The upper end of the partition 3 is screw-threaded, as at 5, and screwed into the stock.

6 indicates a way through the upper end of the partition, leading from the slot 4 into a spring-chamber 7, provided in the stock above the partition.

8 indicates a cross-head in the slot and provided with a stem 9, extending through the way 6 into the spring-chamber.

10 indicates the spring in the spring-chamber for normally holding the stem up.

11 indicates nuts on the upper end of the stem to rest upon the spring.

12 indicates a jaw member provided with a tapering shank 13 to fit in one of the tapering shank-sockets formed between the partition 3 and the wall of the tapering socket 2 in the end of the stock. The shank 13 is provided with a cross-head socket 14 in the extended plane of the slot 4 of the partition. The jaw member is provided with a shoulder 15 to fit

against the lower end of the stock when the shank is fully seated in the tapering socket. 12' indicates a like jaw member provided with the shank 13', cross-head socket 14', and shoulder 15', and said jaw member 12' is arranged with its shank in the other socket formed therefor between the partition 3 and the wall of the tapering socket 2. The cross-head 8 is arranged to play in the slot 4, and its opposite ends are inserted in the cross-head sockets 14 14', so that the two jaw members carried by the spring 10 through the medium of the stem and cross-head.

16 indicates a spring-pressed bolt normally extending across the slot 4 in the path of the cross-head 8 to lock the cross-head against lowering. In Fig 3 the normal locking position of this bolt is indicated in dotted lines at the lower end of the view. The outer end of the bolt is provided at its upper side with a beveled face 17, which is normally chambered in a portion of the bolt-hole 18, which extends through the partition and through the stock, being closed at one end by a screw-plug 19.

20 indicates a spring in the bolt-hole to normally hold the bolt 16 normally inserted across the slot 4 with its beveled portion 17 fully beyond the slot.

21 indicates a bolt-retracting pin mounted in the bolt-hole and normally projecting from the side of the stock to be engaged and thrown by the well-casing 22 to bring the bolt 16 into position shown in solid lines in Fig. 4, with the beveled face 17 of the bolt in the path of the cross-head 8. The cross-head 8 has a beveled face 23 to engage the beveled face 17 of the bolt when the bolt is in its retracted position. (Shown in solid lines in Fig. 4.)

The spring 10 is of sufficient strength to normally hold the jaws 12 12' in their up-drawn position, with their shanks fully seated in the sockets therefor. The bolt-hole 18 is larger at the end which is closed with the plug 19 than at the opposite end, and shoulders 24 and 25 are provided to respectively prevent the bolt and the bolt-retracting pin from being thrown too far by the force of the bolt-spring 20. Preferably the bolt 16 is provided with a chamber 26 to seat one end of the spring 20, and the spring-holding plug 19 is provided with a like chamber 27 to seat the other end of the spring 20.

For convenience in assembling the parts the cross-head stem 9 is made of two parts, one of which, *a*, is integral with the cross-head and the other, *b*, is screwed to the part *a*. The part *a* of the stem together with the cross-head are of less length than the slot 4, and said stem is of greater length than the way 6, so that the part *a* and cross-head 8 can be inserted into the slot and the section *a* then pushed up through the way 6. Then the section *b* of the stem 8 is screwed onto the section *a*, after which the spring is placed in

position and the nuts 11 screwed down into place to give the appropriate tension to the spring which rests upon the upper end of the partition 3. Then the jaws 12 12' are placed against the sides of the partition with their sockets 14 14' caught over the ends of the cross-head 8, and the parts thus assembled are inserted into the conical socket 2 and turned to screw the screw-threaded upper end of the partition into the screw-threaded part therefor in the stock. 28 indicates a screw inserted through the stock and screwed into the partition to prevent the partition from unscrewing. After the parts have thus been assembled the bolt-retracting pin 21 is inserted into the bolt-hole and guideway 18. Then the bolt 16 is inserted into the bolt-hole 18 and the spring 20 is brought into place and the plug 19 screwed home. The tool is then in condition for operation.

In practical operation in order to start the tool down into the well through the casing 22 the workman will first push the bolt-retracting pin 21 in into the position indicated in solid lines in Fig. 4 and then will draw the jaws 12 12' down into the position indicated in Fig. 1. Then the tool will be let down into and allowed to pass through the casing. It is to be observed in Figs. 1 and 4 that the jaws are rounded, as at 29, so that the cutting edge of the jaws are returned when the jaws are in their down-drawn position, so that the cutting edges will not touch the casing during the descent of the tool. When the tool has passed beyond the shoe 22' of the casing, the spring 10 draws the cross-head up, thus drawing the bits up into their socket in the stock. The jaws engaging the walls of the well will be held thereby sufficiently so that the downward stroke of the stock assists the action of the spring to seat the jaw-shanks firmly in their sockets, thus bringing the shoulders 15 15' to fit firmly against the end of the stock. The spring 20 throws the bolt 16 and the pin 21 so that the beveled face 17 of the bolt is chambered in the partition, and the cross-head is thus effectually locked against drawing out of the stock on the upstroke of the stock. Whenever the tool is drawn upward so far that the pin 21 is again forced in by the shoe 22' of the casing, the bolt is thrown into its unlocking position, so that when the shoulders 15 15' of the jaws engage with the shoe 22' the cross-head is free to slip in the stock, thus to allow the stock to be drawn up while the jaws collapse into the position indicated in solid lines in Fig. 1 and in dotted lines in the upper position in Fig. 3. The tool can therefore be readily drawn out through the casing and can be lowered and raised at pleasure, and whenever it is below the casing it is ready for effective operation, as before described.

The partition 3 is flat-faced and holds the jaws spread apart when the shanks are fully

seated in the shank-sockets. The ends of the cross-head have sufficient play in their sockets to allow the jaws to swing freely toward each other as the shanks withdraw from the shank-sockets.

The bolt and its retracting-pin are to be located as close as possible to the shoulders and the cutting edges of the jaws, so that the jaws may become locked as soon as possible after passing below the lower end of the casing and will work in locked position very close to the bottom of the casing, and yet will always be fully unlocked before the shoulders can injure the bottom of the casing on an upstroke.

What we claim, and desire to secure by Letters Patent of the United States, is—

1. An underreamer comprising a stock provided with two tapering sockets in its lower end, a vertically-slotted wedge-shaped partition between the sockets, and having bolt-holes opening from the slot axially in line with each other below the top of such sockets, such stock being also provided with a spring-chamber above the partition; a jaw member provided with a tapering shank to fit in one of said sockets, and also provided with a shoulder to fit against the lower end of the stock when the tapering shank is seated in its socket, said shank being provided with a cross-head socket in the extended plane of said slot; a like jaw member having its shank seated in the other socket of the stock; a cross-head to play in the slot and having its opposite ends seated in the sockets of the shanks, respectively, and having a stem extending up into the spring-chamber; a spring in said chamber for normally holding up the stem, cross-head and jaws; a spring-pressed bolt normally extending across the slot in the path of the cross-head to lock the cross-head against lowering, said bolt having at the upper side of its end, a beveled portion normally chambered in the partition; a spring for normally holding the bolt in its locking position; and a bolt-retracting pin mounted in the bolt-hole and normally projecting from the side of the stock to be thrown by the well-casing to bring the bolt into position with the beveled portion of the bolt in the path of the cross-head.

2. The combination of a stock provided with a tapering socket in its lower end and with a spring-chamber above said socket and with a screw-threaded portion between said spring-chamber and said socket; a wedge-shaped partition fitted in the socket of the stock and provided with a transverse slot and screwed into the stock and provided with a way leading from the slot through the upper end of the partition; a cross-head in the slot and provided with a stem extending through the way into the spring-chamber; a spring in the spring-chamber for normally holding the stem up; two jaw members carried by the cross-head on the opposite sides of the parti-

tion and each provided with a tapering shank to fit the stock-socket on opposite sides of the partition and also provided with a shoulder to engage the lower end of the stock when the shanks are seated in their sockets in the stock; a spring-pressed bolt to play across the slot in the partition and provided with a beveled portion at the upper side and outer end; and a bolt-retracting pin mounted in the stock and normally projecting from the side of the stock to be thrown by the well-casing to bring the bolt into position with the beveled portion of the bolt in the path of the cross-head.

3. In an underreamer, the combination with a jaw-carrying head having a transverse guideway, of a locking-bolt for said head arranged in said guideway; a pin sliding in said guideway to retract the bolt to unlock the head; a stop for said pin being provided in the guideway; and a spring to normally press the bolt toward the stop and into locking position, and to project the pin from the head to be returned by contact with the casing.

4. An underreamer-stock provided with a socket in its lower end; a slotted, downwardly-tapering partition rigidly fixed in the socket to form two shank-seating sockets to seat the shanks of two jaws on opposite sides of said partition; a jaw on each side of said partition and a jaw-carrying head moving in the slot of said partition.

5. An underreamer comprising a stock, the lower end of which has two upwardly-tapering shank-seating sockets with a flat-faced downwardly-tapering partition rigidly fixed between said shank-seating sockets; a vertically-movable cross-head in the slot of the partition; shouldered jaws carried by said cross-head; and an upwardly-tapering shank for each socket.

6. An underreamer comprising a stock provided with a socket in its lower end; a stationary slotted partition fastened in the socket and extending from side to side thereof to form two shank-seating sockets to seat the shanks of two jaws on opposite sides of said partition; a jaw-carrying head moving in the slot of said partition; means for yieldingly holding said head up; and jaws carried by said head and having shanks seated in said sockets.

7. An underreamer comprising a stock provided with a plurality of tapering sockets in its lower end; a stationary, vertically-slotted partition separating the socket; a jaw member; a tapering shank for said jaw member, said shank being provided with a cross-head socket in the extended plane of said slot; a like jaw member having its shank seated in an opposite socket of the stock; a cross-head to play in the slot and having opposite ends seated in the sockets of the shanks, respectively, and having an upwardly-extending stem; means for yieldingly holding up the stem cross-head and jaws; a spring-pressed bolt normally extending across the slot in the path of the cross-

4

762,435

head to lock the cross-head against lowering, said bolt having at its upper end a beveled portion; a spring for normally holding the bolt in its locking position; and means adapted to be engaged by the well-casing to bring the bolt into position with the beveled portion thereof in the path of the cross-head.

In testimony whereof we have signed our

names to this specification, in the presence of two subscribing witnesses, at Los Angeles, 10 California, this 28th day of November, 1899.

THOS. A. O'DONNELL.

ARTHUR G. WILLARD.

Witnesses:

JAMES R. TOWNSEND,

FRANCIS M. TOWNSEND.

CONTENTS:

Application papers. O. K.

1. Rej. Jan. 6, 1900.
2. Amendment. Oct. 30, 1900.
3. Rejection. Nov. 26, 1900.
4. Amendment A. Nov. 19, 1901.
5. Rej. Dec. 3-1901.
6. Amendment B. Dec. 28, 1901.
7. Rej. Feb. 19, 1902.
8. Amdt. C. Dec. 15-02.
9. Rej. Jan. 3, 1903.
10. Amdt. D. Nov. 9-03.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.
- 19.
- 20.
- 21.
- 22.
- 23.

TITLE:

Improvement in Underreamers and Drills.

[Endorsed:] No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit, Certified Copy of File Wrapper & Contents O'Donnell & Willard U. S. Patent. Filed May 8, 1917. No. 762,435. F. D. Monckton, Clerk.

Defendant's Exhibit U. S. Day Patent 403,877.

[Endorsed]: U. S. Dist. Court, So. Dist. of Cal., So. Div. #1540—In Equity. Union Tool Co. et al. vs. Wilson & Willard Mfg. Co. "Defendant's Exhibit U. S. Day Patent No. 403,877." Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit U. S. Day Patent 403,877. Filed May 8, 1917. F. D. Monckton, Clerk.

(No Model.)

J. E. DAY.

WELL BORING OR DRILLING APPARATUS.

No. 403,877.

Patented May 21 1889.

Fig.1

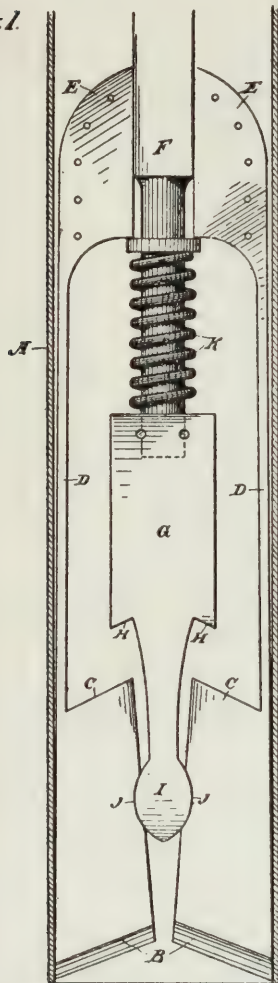
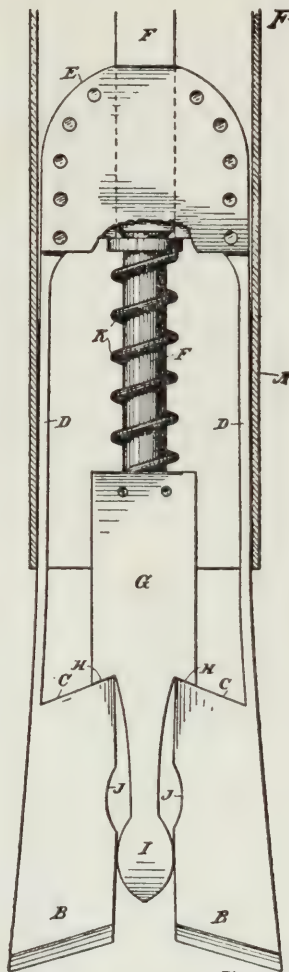


Fig.2



Witnesses,
Geo. H. Strong
J. H. Hulse

Inventor
Jeremiah E. Day
By Duway & Co
attys

UNITED STATES PATENT OFFICE.

**JEREMIAH E. DAY, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR
OF ONE-HALF TO JOSEPH PRACY, OF SAME PLACE.**

WELL BORING OR DRILLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 403,877, dated May 21, 1889.

Application filed February 11, 1889. Serial No. 299,497. (No model.)

To all whom it may concern:

Be it known that I, JEREMIAH E. DAY, of the city and county of San Francisco, State of California, have invented an Improvement in Well Boring or Drilling Apparatus; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in well-drilling apparatus, and especially to that class of apparatus which is employed for drilling in rock or hard material where jars and drills are employed; and it consists in the constructions and combinations of devices, which I shall hereinafter fully describe and claim.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a vertical section taken through the well tube or casing, showing the drills and connected mechanism within the casing in position to be lowered to the bottom of the well. Fig. 2 is a view showing the drill below the bottom of the well-casing and expanded ready for work.

A is the well-casing.

B B are the drills or cutting-tools, which have their cutting-edges beveled outward, as shown. The shanks of these tools are made of considerable thickness for a short distance above the cutting-points, and at C is formed an offset or shoulder from which the remainder of the shank extends upwardly in the form of a comparatively thin plate, D, which is sufficiently elastic to allow the lower parts or cutters to open and close as much as may be necessary for the work. The upper ends are again thickened or enlarged, as shown at E. The rods from the surface come down inside the casing at F. They pass between the two sides of the drill-shanks, and, extending downwardly between the elastic portions D, the lower end of the rod F is fitted into the upper end of the block G, and is held in place by boring holes through the block, which go one half into each side of the rod F, and placing bolts or rivets therein.

At the bottom of the block G, and on each side to correspond with the shoulders C, are formed similar shoulders, H, the shoulders C and H being beveled, so that when the shoulders H rest upon the shoulders C the tendency of the bevel is to keep the drill-shanks from

spreading apart by the concussion of the blow upon the shoulders. Below the shoulders H a spear-point, I, is formed, and the thickened extensions between the drill-points B and the shoulders C are grooved or chambered out, as shown at J, sufficient to receive the spear-head I and inclose it between the sides of the concavities J.

That portion of the rod F which passes between the upper ends, E, of the drill-shanks is made square. Below this point it is made somewhat smaller and cylindrical until it enters the block G. Around this cylindrical portion is placed a stout spiral spring, K, and above this spring is a loose sliding washer, L, against which the upper end of the spring acts. This washer is of such diameter as to lie between the thin elastic portions D of the drill-shanks, and will not pass up between the upper thickened ends, E.

The lower end of the spring K presses against the top of the block G, and the tendency of the spring is to force the cutters up until the shoulders H are in contact with the shoulders C of the drill-shanks.

When the spear-head I lies within the depressions J of the drill-shanks, the points of the drills are drawn toward each other by the elasticity of their shanks D; but when the drill-shanks are forced up so that the spear-head lies between the drill-shanks below the concavities J it will spread the drill-points B apart, so that they will be of greater diameter than the exterior of the tube or casing A, and this only takes place after the drills have been lowered to the bottom of the well and below the bottom of the casing, as shown in Fig. 2.

The operation will then be as follows: The spear-head I is drawn up until it lies within the concavities J of the drill-shanks, the springs K being compressed by this action, and the shanks of the drills are contracted or drawn in sufficiently to pass easily down the well tube or casing A. As soon as the lower ends of the drills have passed out of the casing and rest upon the rock or bottom to be drilled, the weight of the rod above and the action of the spring K force the block G and the spear-head I downward until the latter has passed out of the concavities J and between the lower portions of the drill-shanks.

The drills are thus spread apart, so as to be of greater diameter than the exterior of the casing. The drill-rods are then lifted up and allowed to fall, the weight acting upon the drill-points and cutting away the bottom in the usual way, giving a diameter large enough to allow the casing to pass down freely. The shoulders H engage with the shoulders C, which are very near to the points of the drills, so that only the very thick metal intervenes between the points of the drills and the shoulders. It will be seen that the blows applied through the shoulders at this point act more directly upon the points of the drills than if they were applied at the upper ends, E, and by this construction the jar and strain is taken off from the thin elastic portions D of the drill-shanks.

When it is necessary to remove the drills from the well, by drawing up the rods the weight of the drill-shanks is sufficient to compress the spring K until the spear-head I is again brought into the concavities J, when the shanks will close up sufficiently to allow the drills to be drawn up through the well tube or casing again.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is —

1. The drill-rod having the undercut beveled shoulders at the lower end and the spear-head extending below these shoulders, as shown, in combination with the independent drill-shanks lying upon each side of the drill-rod and spear-head, the shanks of the drills being provided with shoulders corresponding with and engaging those of the rod when the latter is lowered, and having concavities or depressions within which the spear-head is inclosed when the rod is raised, substantially as described.

2. The drill-rod with undercut shoulders and spear-head, as shown, the drills inclosing said rod, having concavities within which the spear-head may lie, and shoulders which engage the shoulders upon the rod, in combination with a spring and a sliding collar or plate between which and a fixed collar upon the rod the spring is compressed, substantially as described.

In witness whereof I have hereunto set my hand.

JEREMIAH E. DAY.

Witnesses:

S. H. NOURSE,
H. C. LEE.

Defendant's Exhibit U. S. Mack Patent No. 492,371.

[Endorsed]: U. S. Dist. Court, So. Dist. of Cal., So. Div. No. 1540—In Equity. Union Tool Co. et al. vs. Wilson & Willard Mfg. Co. "Defendant's Exhibit U. S. Mack Patent 492,371." Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit U. S. Mack Patent No. 492,371. Filed May 8, 1917. F. D. Monckton, Clerk.

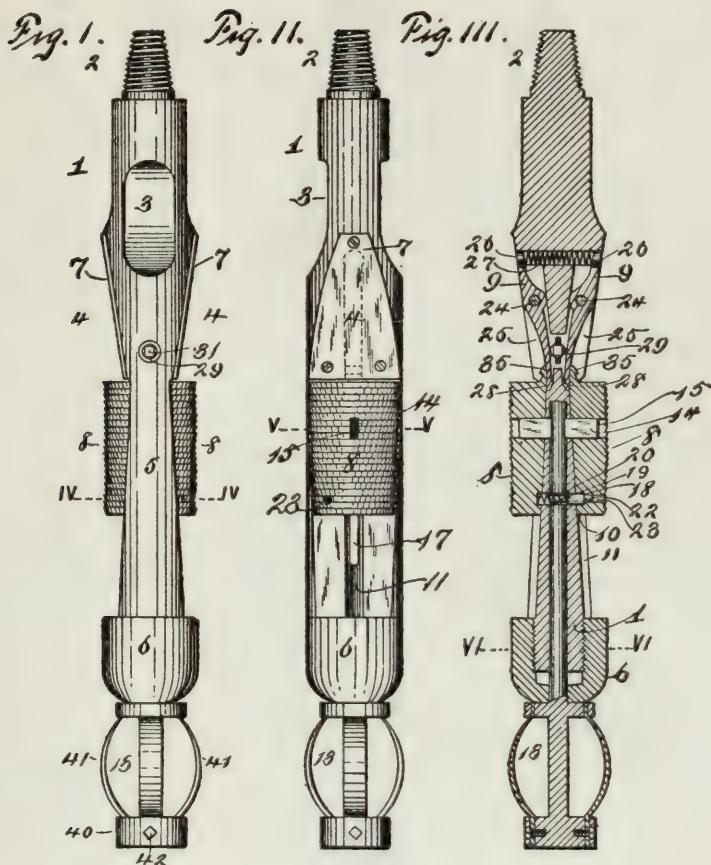
(No Model.)

2 Sheets—Sheet 1.

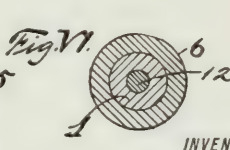
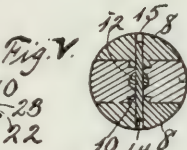
P. H. MACK.
CASING SPEAR.

No. 492,371.

Patented Feb. 21, 1893.



WITNESSES



INVENTOR

Patrick H. Mack

BY

Knight Bros

ATTORNEYS

Ben R. Haagar.
J. Thomas

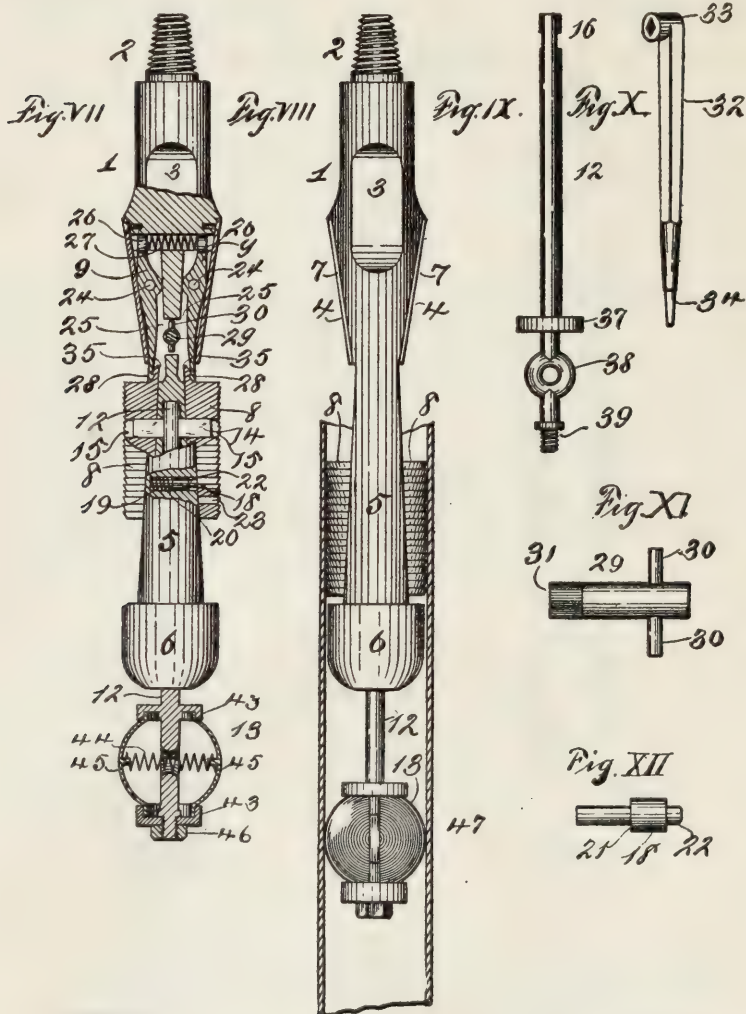
(No. Model.)

3 Sheets—Sheet 2.

P. H. MACK.
CASING SPEAR.

No. 492,371

Patented Feb. 21, 1893.



WITNESSES.
Ben R. Hagar
J. Thomas.

INVENTOR
Patrick H. Mack.
BY Knights Bros.
ATTORNEYS

UNITED STATES PATENT OFFICE.

PATRICK H. MACK, OF BRADFORD, PENNSYLVANIA, ASSIGNOR TO
THE OIL WELL SUPPLY COMPANY, OF SAME PLACE.

CASING-SPEAR.

SPECIFICATION forming part of Letters Patent No. 492,371, dated February 21, 1893.

Application filed April 23, 1892. Serial No. 430,433. (No model.)

To all whom it may concern:

Be it known that I, PATRICK H. MACK, a citizen of the United States, residing at Bradford, in the county of McKean, in the State of Pennsylvania, have invented new and useful Improvements in Casing-Spears, of which the following is a specification.

My invention relates to that class of instruments for removing casing or sections of tubes from wells, in which divided slips are mounted upon a mandrel capable of longitudinal movement thereon and having a supplemental lower grip connected with the slips for the purpose of causing them to move upon the spreading mandrel and secure the initial hold upon the tube, which hold afterward is sufficient to secure that relative movement between the slips and mandrel which results in the secure gripping of the tool in the pipe.

My invention consists in certain features of novelty involved in the construction of respective parts which will hereinafter be particularly pointed out in the claims and first fully described with reference to the accompanying drawings, in which:—

Figure 1 is a side elevation of my improved tool. Fig. 2 is a similar view of the tool in a position at right angles to that shown in Fig. 1. Fig. 3 is an axial section of the tool in a plane parallel to the plane of Fig. 1 and at right angles to the plane of Fig. 2. Figs. 4, 5 and 6 are transverse sections taken respectively on the lines 4—4 Fig. 1, 5—5 Fig. 2, and 6—6 Fig. 3. Fig. 7 is a side elevation of the tool partially in section, the plane being parallel to that of Fig. 1 and the position of the slips upon the mandrel being shifted and held in such shifted position by means of the retaining-dogs, in which position the tool is ready for use. Fig. 8 represents the tool within a tube, the slips having moved a sufficient distance upon the mandrel to secure a rigid hold upon the tube to be lifted. Figs. 9, 10, 11 and 12, are detail views respectively of the initial grip-rod, the operating-wrench, the spreading-key for forcing the dogs into the position shown in Fig. 7, and the locking bolt for locking the slips in the position shown in Fig. 3 as is done when the tool is to be withdrawn from the well without the section.

1 represents the body of the tool which is formed with a screw-head 2, flattened portion

3, beveled sides 4, mandrel 5 and cup 6. The flattened portion 3 adapts the tool for receiving a wrench which screws it on and off and from the drilling tools. The beveled sides 4 receive plates 7 which cover recesses formed in the body above the mandrel for the reception of a pair of dogs 9 which operate to retain the slips 8 in intermediate position when the tool is put into use, which position is shown by Fig. 7. The slips have dove-tails 10 which fit in corresponding grooves 11, formed parallel with the opposite faces of the tapered mandrel as shown in Figs. 2, 3 and 5, whereby said slips are held upon the mandrel and adapted to be spread by relative movement thereon. Passing centrally upward from the body of the tool, is the initial grip-rod 12 having at its lower end a peculiarly formed grip 13 and connected at its upper end with the slips 8, by means of a key 14, which passes through slots 15 in said slips, and the slot 16 in said initial grip-rod. In order to permit the movement of the slips by means of the grip-rod, the mandrel portion of the body is provided with a vertical slot 17 which communicates with the perforation through which the rod 12 passes, so that the key 14 may readily move up and down with the slips.

18 represents a bolt mounted in the recess 19 in the mandrel and outside of the axis of said mandrel, and this bolt has a spring 20 surrounding the reduced portion of the bolt and abutting against its shoulder 21, while the forward reduced end 22 of said bolt enters a socket 23 in the slip. There may be only one of these locking bolts, inasmuch as the two slips are secured together, by the key 14 or there may be two of them, one on each side. The object of this bolt 18 is to lock the slips in their uppermost position automatically, and permit the withdrawal of the tool from the well without binding.

The dogs 9 are pivoted at 24 in recess formed in the body of the tool above the mandrel, and these dogs have at their upper ends bearings 26 for a spring 27 which serves to force the ends apart, while at their lower ends said dogs are provided with hooks 28. The recess 25 is so formed as to permit the ends 28 of the dogs to set in a sufficient distance to permit the slips 8 to move up around them.

29 represents the spreading-key preferably

permanently mounted in the body transversely to the plane of the recesses 25, and this key is rendered larger on one diameter than on the other by means of pins or projections 30. This key has a square head 31 for the reception of a wrench, so that said key may be turned to force the ends 28 asunder in opposition to the spring 27.

In order to turn the key, I provide a tool 32 having a socket 33 which engages over the head 31, as will readily be seen. On the other end of this tool is a reduced projection 34 which is adapted to enter the perforation 23 and force back the bolt 18 in order that the slips may be moved downward upon the mandrel a sufficient extent to free the ends 28 of the dogs 9. When these ends are thus freed they are spread apart by the key 29. Hook projections 35 on the slips are then passed up between said dogs, after which the key is turned to its normal position, and the hooking ends 28 and 35 engage each other so as to hold the slips in the intermediate position shown by Fig. 7. When the tool is in this position it is ready for use. It may be lowered into the well until it passes within the tube-section a sufficient distance, the supplemental grip 13 being thereby compressed and caused to bind therein. The slips cannot be moved upward in this operation by the supplemental grip 13 because of the position of the ends 28 of dogs 9. Having passed a sufficient distance within the tube section, the tool is drawn upward slightly. By this operation the supplemental grip 13 operates to drag the slips away from the ends 28 of the dogs. This movement will be continued until the slips secure a hold in the wall of the tube, after which a further movement will cause the mandrel to move upward relatively to the slips and force the upwardly inclined teeth of the slips into the metal of the tube. The tool being thus securely connected with the tube section and continued movement serves to raise the latter from the well. This position of the tool in the tube is shown clearly by Fig. 8. Should it be desired to release the tube or casing for any cause, as for instance, when the tool is used for lowering the casing into the well, a sudden downward movement, will cause the mandrel to drop a certain distance relatively to the slips, the ends 28 having previously returned to their normal positions as shown in Fig. 3, whereupon the bolt 18 will enter the socket 23 in the slips and the tool will be locked into inoperative position, after which it may be withdrawn readily from the well.

For the purpose of affording a stop or abutment for the slips at the lower end of the dog, a cup 36 is screwed onto the lower end of the body as shown more clearly by the sectional view Fig. 3.

The initial grip-rod 12 carries at its lower end a collar 37 and eye 38 and the threaded end 39, to receive an additional collar 40. The supplemental grip may consist either in the

series of spring-bows 41 as shown in Figs. 1, 2 and 3 having their ends secured in sockets formed in the respective collars 37 and 40 by means of screws 42, or said supplemental grip may consist in bows 41 having their ends set between flanged collars 43 as shown in Fig. 7 and forced asunder by means of the spring 44 which passes through the eye 38 and is seated around lugs 45 formed in the inner base 41. In this form the lower collar may be secured by means of a nut 46. Or as a further modification, this supplemental grip may consist in a spherical body as 47, formed in two parts and forced asunder in any suitable manner as by means of the spring 44 shown in Fig. 7.

In using my improved casing-spear, the parts being in position shown by Figs. 1, 2 and 3, and the bolt 18 being engaged in the socket 23, said bolt is forced back by means of the end 34 of the wrench 32, after which the slips are pushed down a sufficient distance to free the lower ends of the dogs 9, so that the spreading-key 29 may be turned by the application of the head 33 of the wrench 32 to the nut 31 of said key and the dogs forced into the position shown in Fig. 7. The slips are then pushed upward until their hooked ends 35 engage the correspondingly formed ends 28 of the dogs 9, when the spear is ready to be lowered into the well. On entering the pipe or section, the auxiliary or supplemental grip 13 binds in said section but cannot operate to force the slips upward owing to the position of the dogs 9. The tool may therefore be forced a sufficient distance into the section to enable the slips 8 to come in contact with the walls of said section. When the spear has reached the desired point it is raised so that the supplemental grip 13 through the medium of the controlling rod 12, will pull the slips down from engagement with the dogs and held down while the mandrel passes up between the slips and forces them into rigid engagement with the casing. Having reached their lower limit of movement, or being bound tightly upon the wedge-shaped mandrel, continued movement of the tool upward will draw the section with the tool. Should it be desired for any purpose to release the section, the upward movement of the tool may be suddenly reversed, when the mandrel will drop relatively to the slips a sufficient distance to allow the bolt 18, by its ends 22, to engage in the recess 23 and lock the slips in their permanent position, after which, there can be no binding effect of the slips in the section, and the tool may be withdrawn with ease.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In a casing spear, the combination of the body formed with the mandrel, the longitudinally movable and expansible slips surrounding the mandrel, and the pair of locking dogs mounted in the body above the slips and

adapted to engage them and a spring connected with the dogs for holding them out of engagement when the slips are released, substantially as and for the purpose set forth.

2. In a casing-spear, the combination of the body, formed with the mandrel, the longitudinally movable and laterally expansible slips surrounding the mandrel, the pair of spring-pressed dogs mounted on the body above the slips and normally out of engagement with the slips; said slips having an extension adapted to enter between and engage the dogs, substantially in the manner and for the purpose set forth.

3. In a casing-spear, the combination of the body, formed with the mandrel, the expansible slips surrounding said mandrel whereby upward movement of the mandrel within the slips causes them to grip the tube, and the self-releasing means for preventing the relative movement between the slips and the mandrel when the tool is lowered, consisting of the notched extension on the mandrel and the pair of dogs mounted in a recess in the body and adapted by their respective ends to engage the slips, and springs for forcing them out of engagement when released from the slips, a recess being extended as shown to receive the ends of the dogs whereby the slips move up around them for the purpose explained.

4. In a casing-spear, the combination of the body formed with the mandrel, the surrounding expansible slips on the mandrel, the beveled upper portion of the body having a recess, the automatically releasing and retaining dogs, mounted in said recess, and the

plates for covering the dogs, substantially as and for the purpose set forth.

5. In a casing-spear, the combination of the body formed with the mandrel, the expansible slips surrounding the mandrel, the automatic releasing and retaining dogs for engagement with the slips as explained, and the spreading-pin located between the dogs for forcing them apart in the manner and for the purpose set forth.

6. In a casing-spear, the combination of the body formed with the mandrel, the slips mounted upon the mandrel, the supplemental grip consisting of the pair of disks, and the curved springs having their ends secured loosely in the respective disks and a rod projecting from the supplemental grip upward through the body and connected with the slips by means of the cross-key; said body or mandrel being formed with an elongated slot in which the key works, substantially as and for the purpose set forth.

7. In a casing-spear, the combination of the body formed with a mandrel and having the slips mounted upon the mandrel, and supplemental grip device adapted for frictional contact with the wall of the casing and having working connection with the slips; said supplemental grip consisting of the spherically or cylindrically formed compressible parts, with the interposed spring for forcing the parts asunder constructed in substantially the manner specified.

PATRICK H. MACK.

Witnesses:

J. W. WILLIS,
W. G. LONG.

**Defendant's Exhibit U. S. North Patent No.
674,793.**

[Endorsed]: U. S. Dist. Ct., So. Dist. of Cal., So. Div. In Equity—No. 1540. Union Tool Company et al. vs. Wilson & Willard Mfg. Co. “Defendant's Exhibit U. S. North Patent 674,793.” Leo Longley, Special Examiner. Filed April 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit U. S. North Patent 674,793. Filed May 8, 1917. F. D. Monckton, Clerk.

No. 674,793.

Patented May 21, 1901.

E. NORTH.

UNDERREAMER AND EXPANSION BIT.

(Application filed Nov. 2, 1900.)

(No Model.)

Fig I

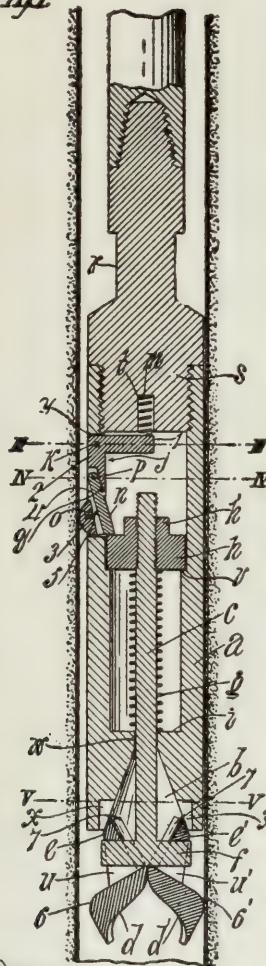


Fig I

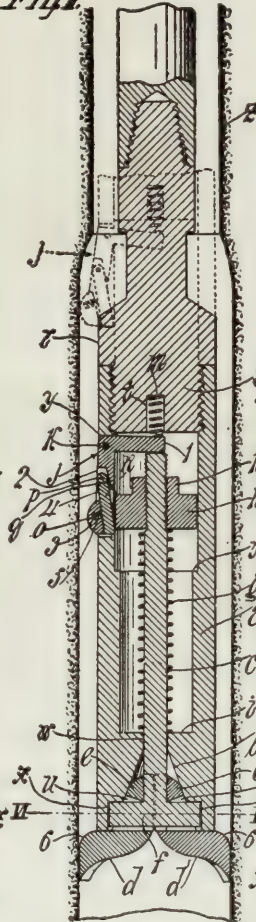


Fig II

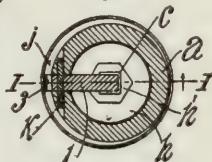


Fig IV

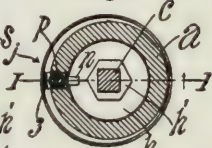


Fig V

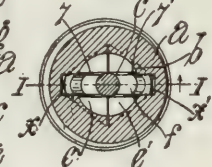
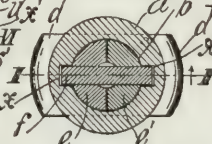


Fig VI



Inventor

Edward North
by Townsend Bros
his Atty.

Witnesses
Douglasman
J. Townsend.

UNITED STATES PATENT OFFICE.

EDWARD NORTH, OF LOS ANGELES, CALIFORNIA.

UNDERREAMER AND EXPANSION-BIT.

SPECIFICATION forming part of Letters Patent No. 674,793, dated May 21, 1901.

Application filed November 2, 1900. Serial No. 35,281. (No model.)

To all whom it may concern:

Be it known that I, EDWARD NORTH, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Underreamer and Expansion-Bit, of which the following is a specification.

The objects of my invention are extreme simplicity, cheapness of construction, great strength, freedom from getting out of order, positive action, positive locking in collapsed position while passing through the casing, and ready unlocking and expansion upon issuing below the casing.

The accompanying drawings illustrate my invention.

Figure I is an axial section of my newly-invented underreamer and expansion-bit as the same appears in passing through the casing. Lines I I in Figs. III, IV, and V indicate the line of section. Fig. II is a like section on line II II, Fig. VI, showing the tool in operation beneath the casing. Dotted lines indicate the position of the parts of the latch just after passing through the casing. Fig. III is a plan section on line III III, Fig. I. Fig. IV is a plan section on line IV IV, Fig. I. Fig. V is a plan section on line V V, Fig. I. Fig. VI is a plan section on line VI VI, Fig. I.

a indicates a hollow body member furnished in its lower end with an upwardly-tapering socket *b*.

c indicates a jaw or bit carrying rod sliding through such socket and extending up in the body.

d d' indicate two jaws pivoted to said rod and respectively furnished at their upper ends with the shanks *e e'* extending above the pivot *f*, which is preferably a cross-head at the lower end of the rod *c*. The shanks enter the conical socket *b*, and when fully inserted therein fit the socket snugly to hold the jaw expanded, as indicated in Fig. II, and may be withdrawn sufficiently therefrom to allow the tool to be collapsed, as indicated in Fig. I.

g indicates a spring to normally hold the rod *c* withdrawn into the body or barrel *a* of the tool, thus to hold the shanks *e e'* of the jaws positively seated in the tapering socket

b and the jaws consequently expanded, as shown in Fig. II.

h indicates a nut screwed onto the inner end of the rod *c* to form a projection, against which the spring *g* presses to hold the rod in normal position with the jaws expanded.

i indicates an internal shoulder in the body *a* to sustain the lower end of the spring *g*.

h' indicates a boss on the nut *h* to receive a wrench, by which said nut may be turned to screw it onto or off of the rod *c*, the inner or upper end of which is screw-threaded to receive it.

j indicates a latch-carrier pivoted to the body *a* by a pivot *k* and furnished with an inwardly-extending arm 1, acted upon by a spring *m* to normally hold the other arm 2 extended aslant outwardly and downwardly, as indicated in dotted lines in Fig. II, and to allow it to be pressed in by the casing, as shown in Fig. I. The latch-carrier arm 2 is furnished with a rounded boss 3 at its lower end to engage the casing and to be thereby pressed in when the tool is passing through the casing.

n indicates a latch pivoted in a recess 4 in the latch-carrier *j*.

o indicates a spring in a recess 5 in the latch-carrier to hold the latch *n* normally impressed.

p indicates the pivot of the latch, by which it is pivoted in the recess 4 in the latch-carrier.

The spring *o* normally holds the latch in position, with its inner face aslant inward and downward, so that the nut *h* will readily pass down past the latch *n*, and so that after the nut *h* has passed the latch it will project inward above the nut *h* to prevent it from being thrown up by the spring *g*. The pivot *p* of the latch *n* is located above a stop *q*, formed by the inner wall of the recess 4, in which the latch *n* is pivoted, and the spring *o* is located below the stop, so that the stop prevents the latch from being thrown too far in by the spring *o*.

r indicates the barrel-carrying tool shank or stock, furnished with a screw-threaded pin *s*, which screws into the top of the barrel or body *a*. The spring *m* is seated in a socket *t* in the lower end of the pin. The cross-head *f* is seated in perforations or holes *u u'* in the

674,793

shanks *e e'* respectively, and the holes are of sufficient size to allow the jaws to drop down into their collapsed position whenever the rod *c* is forced down into position to allow the shanks to spread apart in the socket.

v indicates a shoulder in the barrel or body *a*, which forms a stop for the nut *h*, thereby affording positive means to prevent the rod *c* from being drawn too far down. The rod *c* is angular in cross-section throughout the lower portion of its body and passes through an angular way *w* in the barrel or body *a* and which forms the termination of the tapering socket and is thereby prevented from turning. To afford more perfectly secure means to prevent the jaws from turning relative to the barrel when the tool is at work, sockets *x x'* are provided at the lower end of the body, being lateral extensions of the opposite sides of the conical seat *b*, and the cross-head *f* extends laterally beyond the shanks *e e'* to fit into said sockets *x x'* when the rod is retracted to hold the shanks *e e'* seated in the tapering socket.

In practical use the tool is assembled by inserting the angular rod *c* through the tapering socket and through the angular hole *w* and bringing it into position, with the cross-head sufficiently extended to allow the shanks *e e'* to be mounted thereon with the opposite arms of the cross-head inserted in the holes *u u'*, respectively. Then the rod will be further inserted and the shanks fully seated in the tapering socket *b*. Then the spring *g* will be placed in the other end of the barrel or body and around the rod *c*. Then the nut *h* will be screwed into position to prevent the rod from withdrawing sufficiently to allow the shanks to be fully withdrawn from the socket, but allowing the shanks to be withdrawn sufficiently to collapse the tool, as shown in Fig. I. Then the carrier *j*, with its latch *n* in position, as shown, will be placed in the openings *y*, provided therefore in the side of the barrel or body and will be fastened by the pivot *k*. Then the spring *m* will be seated in its socket *t* in the stock or shank *r* of the tool, and said shank or stock will be screwed into the upper end of the barrel or body *a*, so that the spring *m* acts upon the upper arm *l* of the latch-carrier *j* to hold the lower arm of such carrier projected, as indicated by dotted lines in Fig. II. The spring *o* will yieldingly hold the latch *n* inward, so that when the operator desires to lower the tool through the casing *z* he may draw downward in the jaws *d d'*, thus drawing the nut *h* past the latch *n*, which will then be thrown inward by spring *o* to project above the nut *h*, thus to hold the rod *c* from being retracted by the spring *g*. The walls of the seat *y* for the latch-carrier *j* prevent the lower end of such carrier from being thrown too far out by the action of the spring *m* when the rod is thus extended from the tool. Sufficient space is provided to allow the latch *n* to swing out-

ward far enough to allow the nut to pass readily down; but the spring *o* holds the latch in to prevent the return of the nut.

The operator in order to allow the tool to descend through the casing will draw the jaws out, as shown in Fig. I, and will then allow the tool to pass down through the casing. The latch *n* will be held in by the lower end of the carrier and by the spring *o* until the boss 3 passes below the casing, whereupon the spring *m* will throw the carrier out sufficiently to withdraw the latch *n* from above the nut *h*, thus allowing the rod-carrying spring *g* to retract the rod and bring the jaws and their shanks into the position shown in solid lines in Fig. II. Dotted lines in Fig. II indicate the position the latch and latch-carrier will assume immediately after the boss 3 has escaped from the casing. After the nut is thus released the spring *g* will throw the rod up, and the same will engage the arm *l* and will bring the carrier back into the position shown in solid lines in Fig. III.

When it is desired to withdraw the tool through the casing, it will be drawn upward and the upper rounding faces or shoulders 6 6' of the jaws *d d'* will engage the lower end of the casing, and thereby as the tool passes through the casing the jaws will be drawn down into and will be held in the position shown in Fig. I, thus allowing the tool to be withdrawn from the casing.

The shanks *e e'* are channeled by longitudinal channels 7 7' to snugly chamber the rod *c*, so that when the shanks are fully seated in the tapering socket *b* the parts at the lower end of the tool will fit together, so as to form a practically solid body.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. An underreamer or expansion-bit comprising a hollow body member furnished in its lower end with an upwardly-tapering socket; a rod sliding through such socket and extending up in the body; two jaws pivoted to said rod and respectively furnished at their upper ends with a shank extending above the pivot to enter the tapering socket, thereby to hold the jaws expanded; and resilient means for normally retracting the shank to hold the jaw-shanks in the socket.

2. An underreamer or expansion-bit comprising a hollow body member furnished in its lower end with an upwardly-tapering socket; a rod sliding through such socket and extending up into the body; two jaws pivoted to said rod and respectively furnished at their upper ends with a shank extending above the pivot to enter the tapering socket, thereby to hold the jaws expanded; means to prevent the rod from turning in said body; and resilient means for normally holding the shank up to hold the jaw-shanks in the socket.

3. An underreamer or expansion-bit comprising a hollow body member furnished in its lower end with an upwardly-tapering socket;

a rod sliding through such socket and extending up in the body; two jaws pivoted to said rod and respectively furnished at their upper ends with shanks extending above the
5 pivot to enter the conical socket and hold the jaws expanded; resilient means for normally holding the shank up to hold the jaw-shanks in the socket; and positive means to prevent the jaw-shanks from being wholly withdrawn from the socket.

10 4. An underreamer or expansion-bit comprising a hollow body member furnished in its lower end with a tapering socket, the upper end of which socket terminates in an angular
15 way; a rod fitted in said way and sliding through said socket and way and extending up in the body; two jaws pivoted to said rod and respectively furnished at their upper ends with shanks extending above the pivot
20 to enter the conical socket to hold the jaws expanded; and resilient means for normally holding the shank up to hold the jaw-shanks in the socket.

25 5. An underreamer or expansion-bit comprising a hollow body member furnished in its lower end with a tapering socket; a rod sliding through such socket and extending up in the body; two jaws pivoted to said rod and respectively furnished at their upper ends
30 with shanks extending above the pivot to enter the conical socket to hold the jaws expanded; resilient means for normally holding the rod up to hold the jaw-shanks in the socket; means to prevent the complete withdrawal of the shanks from the socket; a latch-carrier furnished with a bearing to engage

the casing to hold a latch in operative position to lock the rod down while the bearing is in contact with the casing; a latch carried by said carrier; and a spring to throw said latch-carrier to release the rod when the bearing is released from the casing.

6. An underreamer or expansion-bit comprising a hollow body member furnished in its lower end with a tapering socket; a rod sliding through such socket and extending up in the body and furnished at its lower end with a cross-head; two jaws pivotally carried by said cross-head and respectively furnished at their upper ends with shanks extending above the cross-head to enter the conical socket to hold the jaws expanded; seats on the opposite sides of the socket to receive the ends of the cross-head; and resilient means for holding the rod up with the cross-head in its seats.

7. The combination of the jaws of the jaw-carrying rod; the body in which said rod plays; resilient means for retracting the rod in the body; a latch-carrier pivoted to the body and furnished with a bearing to engage the well-casing; a latch pivoted to the latch-carrier; a spring for yieldingly holding said latch inward; and a spring for yieldingly holding the carrier outward.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, at Los Angeles California, this 24th day of October, 1900.

EDWARD NORTH.

Witnesses:

JAMES R. TOWNSEND,

JULIA TOWNSEND.

**Defendant's Exhibit U. S. Kellerman Patent No.
679,384.**

[Endorsed]: U. S. Dist. Ct., So. Dist. of Cal., So. Div. In Equity—No. 1540. Union Tool Company et al. vs. Wilson & Willard Mfg. Co. “Defendant's Exhibit U. S. Kellerman Patent No. 679,384.” Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit 679,384. Filed May 8, 1917. F. D. Monckton, Clerk.

No. 679,384.

Patented July 30, 1901.

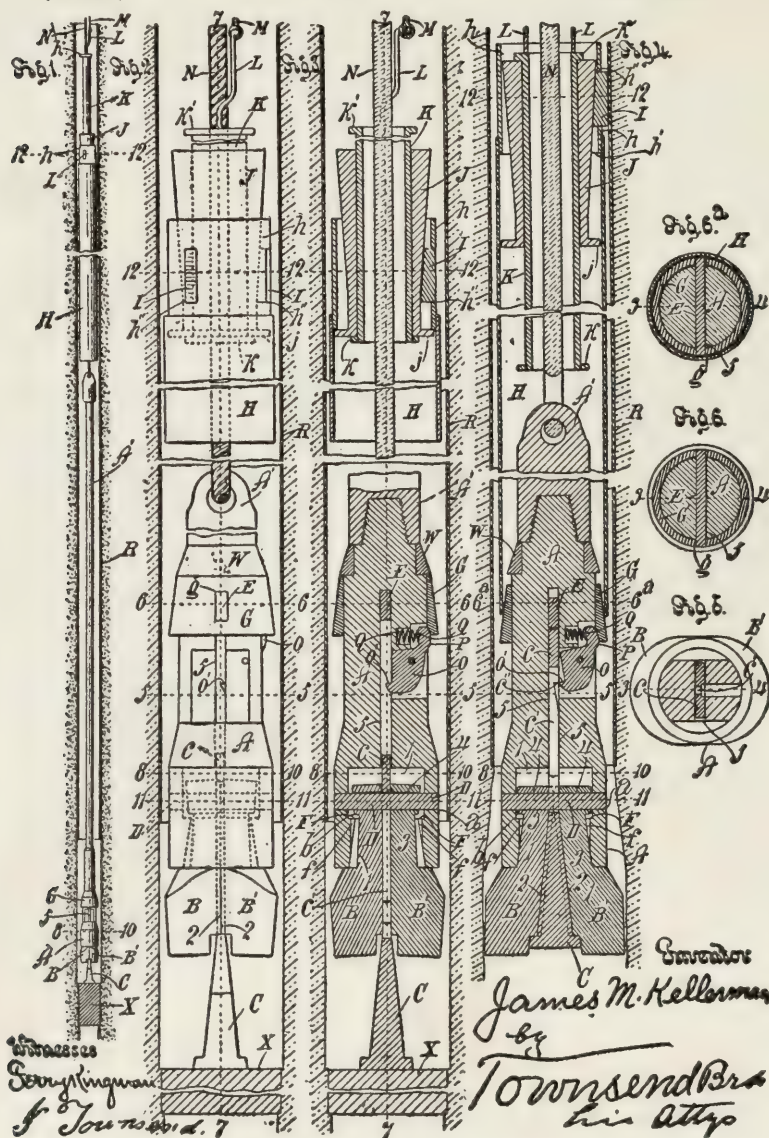
J. M. KELLERMAN.

EXPANDING UNDERREAMER AND DRILL.

(Application filed Oct. 16, 1898.)

3 Sheets—Sheet 1.

(No Model.)



No. 679,384.

Patented July 30, 1901.

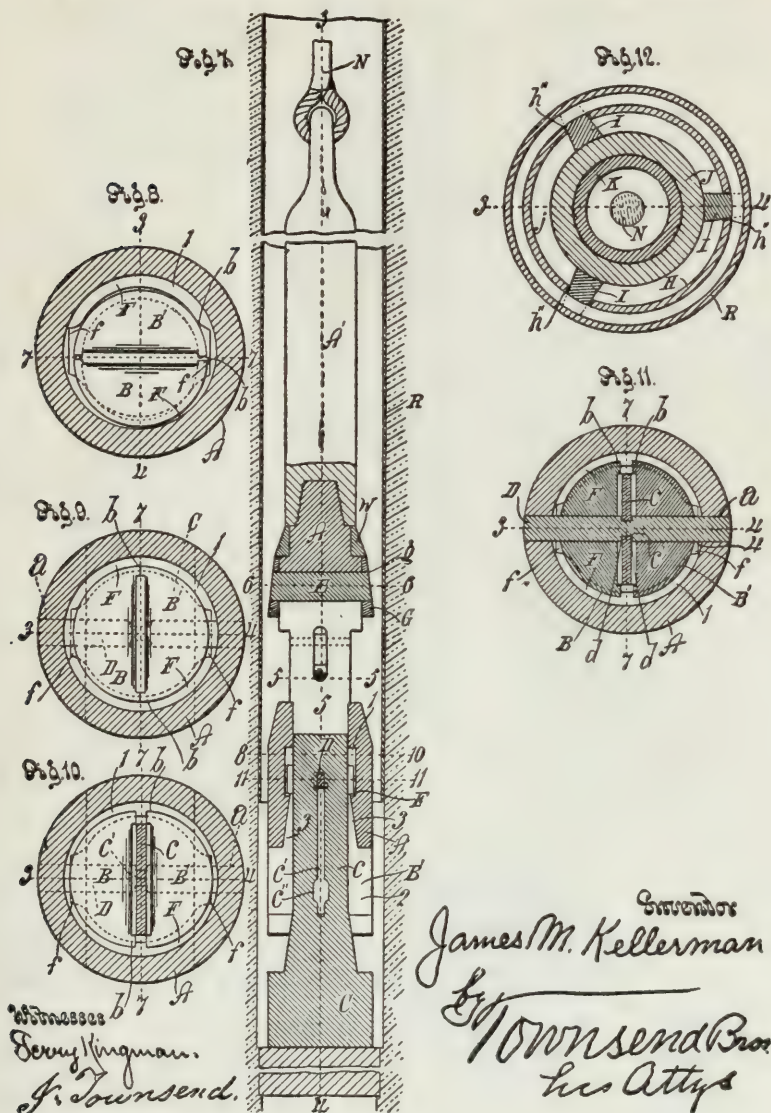
J. M. KELLERMAN.

EXPANDING UNDERREAMER AND DRILL.

(Application filed Oct. 10, 1899.)

(No Model.)

3 Sheets—Sheet 2.



James M. Kellerman
By Townsend Bros.
his Atty's

Witnesses
Serry Kingman.
J. Townsend.

No. 679,384.

Patented July 30, 1901.

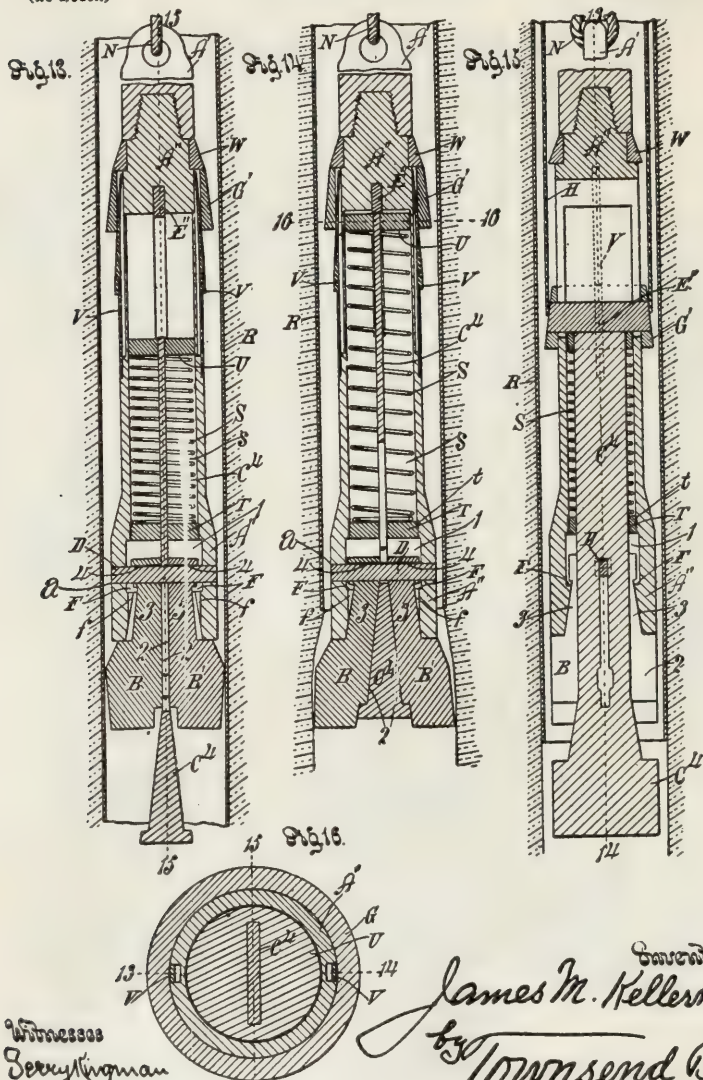
J. M. KELLERMAN.

EXPANDING UNDERREAMER AND DRILL.

(Application filed Oct. 16, 1899.)

3 Sheets—Sheet 3.

(No Model.)



Witnesses

Berryingman

J. Townsend.

Inventor
James M. Kellerman
by Townsend Broa
his Attys.

UNITED STATES PATENT OFFICE.

JAMES M. KELLERMAN, OF LOS ANGELES, CALIFORNIA.

EXPANDING UNDERREAMER AND DRILL.

SPECIFICATION forming part of Letters Patent No. 679,384, dated July 30, 1901.

Application filed October 16, 1899. Serial No. 733,800. (No model.)

all whom it may concern:

Be it known that I, JAMES M. KELLERMAN, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Expanding Underreamer and Drill, of which the following is a specification.

The object of my invention is to provide a practical tool for drilling a hole larger than the casing or for underreaming a hole underneath the casing in a well.

In carrying out my invention I have provided positive means for expanding the bit or reamer and for releasing the bits to allow them to collapse in order to draw the tool out of the casing. I also provide against the use of any pivot-bolts in positions where any strain of the work will be applied.

It is an object of my invention to produce a tool of great strength which will not be liable to become broken and which will not be liable to come to pieces and drop any of its parts in the hole being drilled. In this device the expanding bits are loosely supported in a chambered stock by shoulders and are thrown outward at their lower ends by a wedge, and the wedge may be held in wedging position by a catch or by a spring or by both a catch and a spring. The catch may be of different forms and the device may be varied in its form without departing from my invention.

In the accompanying drawings I have shown the device in two of the forms in which it may be embodied. The wedge is shown both with and without a wedge-sustaining spring.

Figure 1 is a fragmental elevation showing my invention in a well with parts in position ready for expanding the bits for reaming beneath the well-casing, which is shown drawn up for a distance in order to allow a plug to be let down to the reaming-shoulder of the wall of the well below the casing, so as to hold the wedge while the tools are lowered on the wedge, thus to expand the bits. This plug is only required for underreaming beneath the casing when the tool is not provided with a wedge-sustaining spring. In case the tool is used as a drill the bottom of the hole will serve the purpose of the plug shown in this view. Where a wedge-sustaining spring is used, such spring serves the purpose of the plug. Fig. 2 is a fragmental elevation, on a

larger scale, showing more in detail the parts shown in Fig. 1. Parts are broken away to contract the view. Fig. 3 is a fragmental sectional detail in the plane indicated by line 3 4, Figs. 5, 6, 6a, 7, 8, 9, 10, 11, and 12. The parts are not shown in the same position in all of the views. In Figs. 1, 2, and 3 the tool is shown collapsed. Fig. 4 is a fragmental axial section 60 on the same plane as Fig. 3, but showing the parts in position when the tool is expanded. Fig. 5 is a plan indicated by line 5 5, Figs. 2, 3, 4, and 7, with the wedge in wedging position and the bits expanded. Fig. 6 is a plan 65 section on plane indicated by line 6 6, Figs. 2, 3, and 7. Fig. 6a is a plan section on line 6a 6a, Fig. 4. Fig. 7 is a sectional elevation on a plane indicated by line 7 7, Figs. 2, 3, 8, 9, 10, and 11, the stock being sectioned only in part. 70 Fig. 8 is a section on a plane indicated by line 8 10 in Figs. 1, 2, 3, 4, and 7. In this view one of the bits B is shown fully inserted into place with its projection over the shoulder of the stock, while the other bit B' is 75 shown in the inserting position. Fig. 9 is a plan section on said plane 8 10 in Figs. 2 and 3, showing the bits inserted and turned a quarter-turn from the position shown in Fig. 8, so that the bits cannot be withdrawn. Fig. 80 10 is a section on line 8 10, Figs. 1, 2, 3, and 7, with the wedge in place. Fig. 11 is a section on plane indicated by line 11 11 in Figs. 2, 3, 4, and 7. Fig. 12 is a section on line 12 12, Figs. 1, 2, 3, and 4, with the parts in the 85 position indicated in Fig. 3. Fig. 13 is a vertical axial section of my invention as applied with a wedge-sustaining spring. The tool is shown in the act of descending in the casing. Line 13 14, Fig. 15 and 16, indicates the 90 plane of section in Figs. 13 and 14. Fig. 14 is a view of the tool shown in Fig. 13 when the bits are expanded. Fig. 15 is an axial mid-section on line 15 15, Figs. 13 and 16. Fig. 16 is a plan section on line 16 16, Fig. 14. 95

My newly-invented expansion-drill and underreamer comprises a stock A, provided with a transverse opening or way a and with an axial shouldered chamber 1; two bits B B', each being flat on its inner face 2 and hav- 100 ing a circumferentially-channeled neck 3 to seat in opposite sides of said chamber and also provided with a transverse way 4 to register with the transverse way a of the stock

A; a wedge C to seat between the bits BB' to hold them in expanded position and provided with a stem or upward extension *c*, which has a slot *c'* to register with the ways of the bits 5 and stock; a pin D, inserted through the ways of the stock, bits, and stem; means for temporarily holding the wedge in its wedging position, and means for forcing the wedge out of wedging position. The stock A is provided with a slot 5, extending across and lengthwise of the stock at its upper end, the axial chamber 1 and the transverse opening or way *a* being at the lower end of the bit.

E indicates a pin inserted through the stock-15 slot 5 to engage the head of the wedge-stem *c* to force the wedge downward when it is desired to contract the reamer.

F indicates the shoulder of the wall of the chamber 1. The neck of each of the bits is 20 provided with a projection *b* to fit over the shoulder F when the neck is sufficiently inserted into the chamber. The shoulder F of the chamber is notched, as at *f*, on opposite sides of said chamber.

25 In Fig. 8 one of the bits B is shown fully inserted into the chamber 1, and the other bit B' is shown in position for being inserted. The notches *f* allow the ends of the projection *b* of either of the bits to pass the 30 shoulder F while the part B is fully inserted, as shown, and the part B' is laid on top of it, with the notches *f* at opposite edges of the joint between the two bits. When the two bits have been fully inserted and are turned 35 a quarter of the way around, (from the position shown in Fig. 8,) as indicated in Fig. 9, neither one of them can be withdrawn from the stock, for the reason that the ends of the projection *b* will be stopped by the shoulder 40 F. This positively secures the bits against all danger of dropping out. When the bits are in this position, the wedge C will be inserted to bring its stem *c* up into the stock between the bits B and B' and to project 45 above the tops of said bits.

Any suitable means may be provided for temporarily holding the wedge in its upmost position for expanding the bits. In Figs. 1, 2, and 3 I have shown a latch for this purpose, and in Figs. 13, 14 and 15 I have shown a spring for this purpose.

I will now describe the means for forcing the wedge down.

G indicates a sliding member upon the 55 stock A and provided with a keyway *g*. The key or pin E, which is to engage the top of the wedge-stem *c*, is mounted in the keyway *g* of the sliding member G and also in the slot 5 of the stock. This key extends in the path of the stem or extension *c* of the wedge. 60 I provide suitable means for forcing the sliding member downward.

H indicates a weighted member having an upward extension *h*. Said weighted member 65 is arranged to engage the sliding member G to force it downward. The weighted member preferably consists of a piece of pipe or

tube of considerable length to slide up and down with relation to the stock of the drill or reamer. I indicates friction-blocks mounted to slide radially of said weighted member to engage and disengage the walls of the well-casing. The outer faces of these blocks are preferably roughened, as indicated in Fig. 2. One or more of these blocks may be provided, as desired; but I prefer to use three friction-blocks, as indicated in Fig. 12, the same being arranged to slide radially of the extension *h* of the weighted member and being set at equal distances around a wedge J, which is provided for forcing said friction-blocks outward to engage the well-casing. The blocks are preferably wider at their inner portion than the way in which they slide, thus to prevent dropping out.

K indicates a carrier and jar for the block-wedge J. Said carrier moves independently of said wedge to serve as a jar for the wedge. The bail L and rope M constitute means for raising and lowering the carrier independently of the stock A, which is raised by the usual means, such as the rope N. The carrier K is provided with stops *k k'* to limit the movement of the carrier with relation to the wedge J, and the wedge J is provided with a stop *j* to engage with the stop *k'* on the weighted member H. The stop *k'* is preferably formed by the lower end of the extension *h* of the weighted member H. The weighted member H is preferably a long section of iron pipe, and the extension *h* is a shorter section of iron pipe screwed into the top of the long section, the extension *h* being slotted, as at *h'*, to receive the friction-blocks I. The wedge J is preferably a frustum of a hollow inverted cone, which fits around the body of the carrier K. The cone tapers downward, so that when the wedge is lowered with relation to the blocks I it will force said blocks I out through the slots *h'* of the extension *h*. By referring to Figs. 3 and 4 it will be seen that after the wedge C has been brought to rest the weighted member H may be lowered to rest upon the member G and that when the weighted member H engages the member G it will then be held from further descent unless it drives the member G down. If it comes to rest without driving the member G down, the carrier K will then be lowered until the projection or stop *k'* at the top of the carrier engages the top of the wedge J. The weight of the weighted member H and carrier K will then be exerted to force the wedge downward, thereby wedging the blocks I out to firmly engage the casing R. If desired to wedge the blocks with considerable force, this can be done by raising and lowering the carrier K, which is made of metal, and allowing it to strike upon the top of the wedge J after the manner of operating jars. When the blocks have thus been wedged securely, so as to hold the weighted member H firmly, the tools will be drawn upward by the rope N, while the weighted member H remain

stationary by reason of the blocks I. This causes the ring G to remain stationary while the stock A slides up.

In Figs 2, 3, and 4, O indicates a latch pivoted in the stock A and provided with a catch O' to catch in a notch c" in the stem of the wedge. When the stock is drawn upward through the ring member G, a portion P of the latch engages the ring G and is there-fore forced inward against the pressure of the spring Q, which normally holds it out in the path of the ring or sliding member G. The portion or handle P has a sloping face to engage with the ring G, so that as the tool is drawn up the catch is withdrawn from the notch c" in the stem of the wedge, thus releasing the wedge and allowing the key E, which engages the top of the wedge, to force the wedge down, thus to withdraw it from between the bits and allow the bits to collapse as they are drawn up through the casing.

In the form shown in Figs. 13, 14, 15, and 16 a spring S is provided in the stock around the stem c⁴ of the wedge C⁴. The spring is held in the barrel by a plug T, which is screwed into the lower end of the spring-chamber s. U indicates the head of the stem c⁴ of the wedge. The spring S presses up on the head U and normally holds the wedge C⁴ in the expanded wedging position. V indicates spring-plates arranged to catch over the top of the sliding member G when such member is brought down into its lowest position, as indicated in Figs. 15 and 16, thus to hold the wedge down to allow the tool to be drawn out of the casing. W indicates a shouldered projection on the stock to protect the upper end of the sliding member G.

Referring to Fig. 7, it will be noted that the slot c' in the stem c of the wedge is provided with an enlargement C" a short distance above the lower end of the slot, and by referring to Fig. 11 it will be seen that the pin D is notched at the middle, as indicated at d, the lower notched portion fitting the narrow portion of the slot c', while the body of the pin D on each side of the notch is of a width to prevent it from slipping through the enlarged portion c". By this means the pin D can be inserted only by bringing the notch c" to register with the way a. Then the pin D may be drawn in or out, as the case may be; but when the wedge C is at its upper or lower position of movement it is impossible to withdraw the pin D. This insures against any accidental loss of the pin D. The wedge-retaining pin E is held in place by riveting or screwing the outer ends of said pin after the wedge has been inserted through the stock and the ring G. The ring-retaining member W is held in place by the stem A', which is screwed into the end of the stock in the ordinary man-

The way for the pin E is arranged at right angles to the way for the pin D and extends over the top of the stem of the wedge, in the line of the width of said stem, so as to engage with the entire top of said stem.

To assemble the tool shown in Figs. 13, 14, and 15, the plug T will be slid onto the stem, and the spring S brought into place and secured by the cross-head U, which is fastened in place by battering or riveting the end of the stem c⁴. Then the cross-head U, the stem c⁴, spring S, and plug T will be inserted into the chamber s of the stock, and the wedge and its stem will then be rotated, thus turning the plug T until it is screwed well into the screw-threaded seat t therefor in the stock and the wedge held with its width extending in a line drawn from one notch f to the other. Then the bits will be inserted, one at a time, as suggested by Fig. 8, and when in place the wedge and bits will be turned a quarter-way around and the wedge brought into position to allow the pin D to be inserted. When the pin D is in place, the tool is ready for use.

To lower the tool shown in Figs. 13 to 16 into one well, the wedge will be drawn down, as indicated in Fig. 13, and the tool collapsed. Then the bits will be inserted into the casing, which will hold them from expanding until they are below the casing. When the bits are lowered to beneath the casing, the spring causes the wedge to force them out, so that they begin to cut the walls of the well, and upon further operation of the tool the bits will cut their way into the walls, being forced out by the updrawn wedge until the bits are fully expanded. When it is desired to withdraw the tool from the well, the rope M will be lowered to lower the member H, carrier K, and wedge J, and to force the ring G downward or to hold it while the stock of the tool is drawn upward by the rope M, thereby withdrawing the wedge from beneath the bits and drawing the ring G' down below the catches V, thus to prevent the spring from again drawing the wedge C⁴ up to expand the bits. Then the rope M will be drawn upward to lift the carrier K and the wedge J, and thus release the blocks I and allow the sliding member H to be drawn up. Then the tools can be drawn out of the well.

A" in Figs. 13, 14, 15, and 16 indicates the form of stock provided with the wedge-lifting spring, and E' indicates the wedge-operating pin, which strikes upon the head of the wedge-stem c⁴. With these exceptions like characters represent like parts in the several views.

In operating the form shown in Figs. 1, 2, and 3 when the tool is used as an underreamer a block of wood X is dropped into the well to lodge at the reaming-shoulder beneath the casing. The casing being drawn up for a distance above the underreaming-shoulder, the tool will be lowered into the well until the wedge C rests upon the block X.

the cross-head U of the spring-supported wedge-stem c⁴ is held in place by riveting or screwing the top of the wedge-stem at the head of the cross-head.

X. Then the tool will be lowered to force the wedge between the jaws until the catch O' catches in the notches c', thus holding the wedge in place. Then the tool will be operated in the ordinary manner, and the block X will be driven down and broken up by the bits, to be afterward removed in the ordinary course of work.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. An expansion-drill and underreamer comprising a stock provided with a transverse opening or way and with an axial shouldered chamber; two bits, each being flat on its inner face and having a circumferentially-channeled neck to seat in opposite sides of said chamber, and also provided with a transverse way to register with the transverse way of the stock; a wedge to seat between the bits to hold them in expanded position and provided with a stem which has a slot to register with the ways of the bits and stock; a pin inserted through the ways of the stock, bits and stem; means for temporarily holding the wedge in its wedging position; and means for forcing the wedge out of wedging position.

2. An expansion-drill and underreamer comprising a stock having a shouldered chamber and a transverse opening or way at its lower end; two bits, each provided with a neck to seat in opposite sides of said chamber and also provided with a transverse way to register with the lower transverse way of the stock; a wedge to seat between the bits to hold them in expanded position and provided with a stem which has a slot to register with the ways of the stock, bits and stem; means for temporarily holding the wedge in its wedging position; and means for forcing the wedge out of wedging position.

3. An expansion-drill and underreamer comprising a stock with a slot extending across and lengthwise of the stock at its upper end and with an axial chamber and a transverse opening or way at its lower end; two bits, each provided with a neck to seat in opposite sides of said chamber and also provided with a transverse way to register with the lower transverse way of the stock; a wedge to seat between the bits to hold them in expanded position and provided with a stem which has a slot to register with the ways of the bits and which stem extends into said slot of the stock when the wedge is seated to hold the bits expanded; a pin inserted through the ways of the stock, bits and stem; means for temporarily holding the wedge in its wedging position; a pin inserted through the stock slot to engage the head of the stem; and means for operating said last-named pin to force the wedge out of its wedging position.

4. In an expanding bit and underreamer, the combination of a stock provided with a chamber at its lower end, the walls of said chamber being shouldered; two bits, each provided with a neck to seat in said chamber

and provided at the upper end with a projection to fit over said shoulder when the neck is inserted; a wedge to wedge between said bits and provided with a stem to extend above the upper ends of said necks and to hold the necks outward with their projections over the shoulder; means for retaining the wedge in the stock; means for temporarily holding the wedge in its wedging position; and means for forcing the wedge out of its wedging position.

5. An expanding bit and underreamer comprising a stock provided at its lower end with a chamber with shouldered walls, the shoulder being notched on opposite sides of said chamber; two bits, each provided with a neck having a projection to extend over said shoulder to prevent withdrawal of the bits when the two bits are inserted and are turned to bring such projections over the shoulder away from the notches thereof; the ends of said projections being adapted to pass through the notches when the bit is brought into position for that purpose; and means carried by the stock for spreading the bits apart.

6. In an expanding bit and underreamer, the combination of a stock provided at its lower end with a transverse keyway and with a chamber with shouldered walls, the shoulder being notched on opposite sides of such chamber; two bits, each provided with a neck having a projection to extend over such shoulder when the bits are in position for that purpose and to pass through the notches when adjusted for that purpose; each of said bits being provided with a transverse hold or keyway, the two holes registering with said way of the stock when the bits are turned to bring the projections over the shoulder; a wedge provided with a stem inserted between the bits and provided with a slot to register with the said keyways; a key inserted in said keyways; and means for adjustably holding the wedge in its wedging position.

7. An expanding bit and underreamer comprising a slotted stock; two bits loosely secured in the lower end of the stock; a wedge for forcing the bits apart; a sliding member upon the stock and provided with a keyway a key in said keyway and slot and extending in the path of an extension of the wedge means for temporarily holding the wedge in its wedging position; and means for forcing the sliding member downward.

8. An expanding bit and underreamer comprising a slotted stock; two bits loosely secured in the lower end of the stock; a wedge for forcing the bits apart; a sliding member upon the stock and provided with a keyway a key in the keyway and slot and extending in the path of an extension of the bit-wedge means for temporarily holding the bit-wedge in its wedging position; a weighted member to engage the sliding member to force it downward; one or more friction-blocks mounted to slide radially of said weighted member to engage the walls of the well-casing; a wedge

for forcing said friction-blocks outward to engage the casing; a carrier for the block-wedge; and means for raising and lowering the stock.

9. The combination with operative parts of a well drilling or reaming tool, of a weighted member; one or more friction-blocks mounted to slide radially of said weighted member to engage the walls of the well-casing; a wedge for forcing said friction-blocks outward to engage the casing; and a carrier and jar for said wedge.

10. The combination with operative parts of a well drilling or reaming tool, of a weighted member; one or more friction-blocks mounted to slide radially of said weighted member

to engage the walls of the well-casing; a wedge for forcing said friction-blocks outward to engage the casing; and a carrier and jar slidably connected with the wedge and provided with stops to limit its movement relative to the wedge.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, at Los Angeles, California, this 7th day of October, 1899.

J. M. KELLERMAN.

Witnesses:

JAMES R. TOWNSEND,

FRANCIS M. TOWNSEND.

Defendant's Exhibit U. S. Patent to Mack No. 496,317.

[Endorsed]: U. S. Dist. Ct., So. Dist. of Cal., So. Div. In Equity—No. 1540. Union Tool Company et al. vs. Wilson & Willard Mfg. Co. "Defendant's Exhibit U. S. Patent to Mack No. 496,317." Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit U. S. Patent to Mack No. 496,317. Filed May 8, 1917. F. D. Monekton, Clerk.

(No Model.)

P. H. MACK.

2 Sheets—Sheet 1

ENLARGING UNDER BEAMER FOR OIL OR ARTESIAN WELLS.

No. 496,317

Patented Apr. 25, 1893.

Fig. 1.

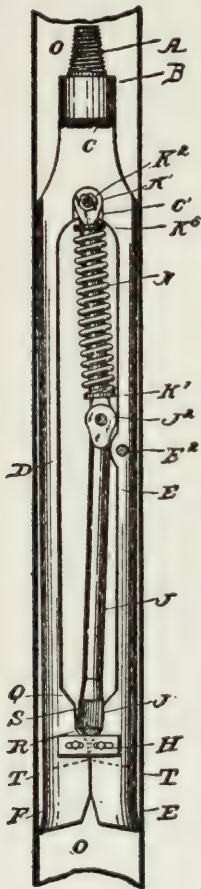


Fig. 2.

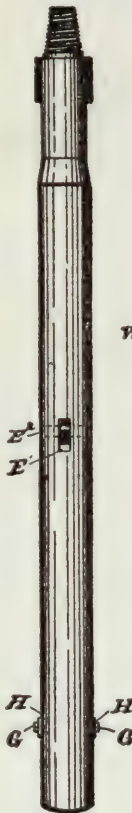
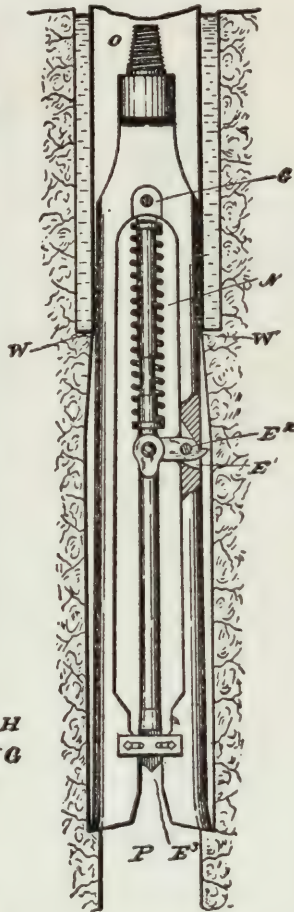


Fig. 3.



WITNESSES:

Fig. 4.

George E. Paine,
E. H. Knight.



INVENTOR

P. H. Mack

BY

Knight Bros

ATTORNEYS.

(No Model.)

2 Sheets—Sheet 2.

P. H. MACK.

ENLARGING UNDER REAMER FOR OIL OR ARTESIAN WELLS.

No. 496,317.

Patented Apr. 25, 1893.

Fig. 5.

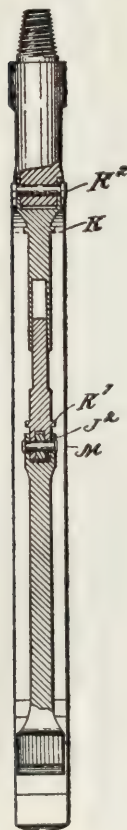


Fig. 6.



Fig. 7.



Fig. 8.

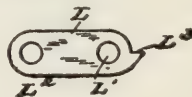
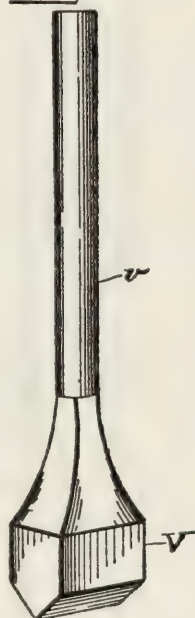


Fig. 9.



WITNESSES:

George C. Green
E. D. Knight

INVENTOR

P. H. Mack
BY *Knight Bros*
ATTORNEYS

UNITED STATES PATENT OFFICE.

PATRICK H. MACK, OF BRADFORD, PENNSYLVANIA.

ENLARGING UNDER REAMER FOR OIL OR ARTESIAN WELLS.

SPECIFICATION forming part of Letters Patent No. 496,317, dated April 25, 1893.

Application filed May 20, 1892. Serial No. 433,789. (No model.)

To all whom it may concern:

Be it known that I, PATRICK H. MACK a citizen of the United States, residing in the city of Bradford, in the county of McKean and State of Pennsylvania, have invented certain new and useful Improvements in Enlarging Under Reamers for Oil or Artesian Wells; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, and in which—

Figure 1 is a longitudinal elevation of my improved tool, shown in the casing with the reaming-bits close together. Fig. 2 is a side elevation of the tool in a position at right angles to that shown in Figs. 1 and 3. Fig. 3 is a longitudinal elevation of the tool in the well and in the same position as that shown in Fig. 1, but with the reaming-bits spread apart. This position is likewise at right angles to that shown in Figs. 2 and 5. The spring is shown in section, and one side of the connection-rod clevis and a section of the leg are broken away. Fig. 4 is a bottom view of the tool as shown in Fig. 3. Fig. 5 is a side elevation of the tool partly in section, in a plane parallel to Fig. 2 and at right angles to Figs. 1 and 3. Fig. 6 is an enlarged view partly in section, of the upper piece of the connecting-rod. Fig. 7 is an enlarged view of the lower piece of the connecting-rod. Fig. 8 is an enlarged view of the latch. Fig. 9 is an enlarged view of a larger mandrel than that shown in Figs. 1, 3 and 5, whose use will be explained hereinafter.

My invention relates to that class of Artesian and oil well drilling-tools known as "well enlarging tools," which are used for increasing the diameter of the well hole, below the bottom of the casing.

In the process of drilling oil-wells, what is termed a "large hole," is started at the top of the well and drilled down to a point below the fresh-water courses. A casing of iron pipe is then put down to the bottom of this hole and made water-tight, and the drilling is then resumed, with drilling-bits narrower than the inside diameter of the casing through which the tools pass freely. The depth of these water-courses vary in different localities, so that the driller has to rely on his own

judgment as to the amount of the casing needed in the well to shut off the said water-courses. He may believe the well hole to be below all of the fresh water courses, insert the casing in the well, and proceed with the drilling for some depth below the casing and then open other water veins. The usual method in such cases is to, withdraw all the casing, extend the large hole past these lower water veins by reaming, and then recase the well. This is not only objectionable but expensive. Moreover a strata of soft rock may be encountered, which if the casing be withdrawn caves in on the tools, and by continued drilling in said strata there is great danger of the tools becoming buried and the hole plugged.

The object of my invention is to obviate the necessity of withdrawing the casing from the well when it becomes necessary to deepen the large hole. This I accomplished by providing a tool that will pass down through the casing and expand so as to enlarge the well hole below the casing to such a diameter as to allow the casing to be lowered to the desired depth by adding lengths or joints to its upper end. This is particularly essential in a well where the rock caves in, as the casing can be kept at such a distance above the bottom of the well as to allow the enlarging under reamer to work freely and at the same time protect the balance of tools from the caving rock, the casing being lowered as the hole increases in depth.

Referring to the drawings:—A is a screw-threaded pin for connecting my enlarging under reamer to the drilling-tools.

B, is a collar, C, is the shank, and D and E, are the legs provided with the segmental reaming-bits F.

Secured to the reaming-bits F, by means of the bolts G are slotted plates H. The object of these slotted plates H is to prevent the reaming-bits F from spreading more than the required distance apart when in use.

J, is a rod provided at its lower end with the mandrel J', the object of which is to separate the reaming-bits F and hold them the required distance apart when they are reaming the hole in the well P, and said rod J is provided at its upper end with the clevis J².

K is a telescoping connecting-rod composed of two pieces, the upper one of which is pro-

vided with the clevis K' for the purpose of connecting it to the shank C, by means of the bolt K². The clevis K' is fitted in the depression C'. The upper part of rod K is also provided with the socket K³ in which the reduced part K⁴ of the lower piece of the connecting-rod K works. This lower piece is also provided with the clevis K⁵ (see Fig. 6) which engages the correspondingly formed end of mandrel rod J. Surrounding the connecting-rod K is a spiral spring N, whose ends bear against the collars K⁶ and K⁷ formed on the respective parts of rod K.

L is a latch provided with perforations L¹ and L² and the projecting end L³. This latch L is inserted in the slot E' of the leg E on the side of the leg E where it is secured by a bolt or rivet E² passing through the hole L' of latch L and the sides of said slot E'. The latch is thus movably secured to leg E. The other extremity of the latch L, fits in between the wings of the clevis K⁵ which latter is fitted between the wings of the clevis J². The latch and both clevises are pivotally secured by the rivet M, so as to form a knuckle or toggle joint between the rods J and K, which is actuated by the latch L.

The method of operating my improved "enlarging under reamer" is as follows:—After screwing the shank into the box of the auger-stem, the drilling-tools are lowered into the casing, the latch L having been pushed down into the slot E' of the leg E, the parts of rod K forced together and the mandrel J' raised from between the reaming-bits F, allowing the latter to be pressed together for entering the casing O. In this position the enlarging under reamer, can pass freely down in the casing as shown in Fig. 2. As soon as the enlarging under reamer passes below the bottom of the casing O, (see Fig. 3) the flaring edges of the reaming-bits F start to cut a shoulder in the wall of the well P. The latch L being now below and free from the casing O, it drops to its lowest position in the slot E' actuated by the spring N. This movement forces the mandrel J' down into the recess E³ between the reaming-bits F and the expansive power of the spring N, will hold it there, preventing the reaming-bits F from being pressed together when working on the walls of the well hole P. When it is desired to remove the enlarging under reamer from the well, the tools are hoisted in the usual manner. As soon as the projecting end L³ of the latch L, reaches the bottom of the casing O it is caught thereon and tripped, with the

effect of forcing it into slot E', compressing the spring N and raising the mandrel J' out of the recess E³ between the reaming-bits F, so that the casing O may press the reaming-bits F together and permit them to pass through as shown in Fig. 1. When the well has been reamed to the desired depth the casing can either be elevated high enough to allow the enlarging tool to cut off the shoulder on which it stands, or if the rock is soft a few blows on top of the casing, will cause the shoulder to break off and the casing will pass through. It will be perceived that there are two angular steps Q and R on the inside of each reaming bit F, and in the space between these is the recess S, formed for the mandrel J', to rest in when not engaged with the reaming bits E. By continued use of the tool, the reaming-bits F will wear, and the frequent dressings consequent thereof, will shorten them up, say to the dotted lines T. In such cases the rod J and mandrel J' are replaced by a similar rod U and mandrel V (see Fig. 9) said mandrel being made large enough to spread the reaming-bits E the desired distance apart when inserted in the recess S and when the mandrel V is raised out of the recess S and the tool assumes the position shown in Fig. 1, it will rest on the steps Q. The additional rod U which is provided with a clevis similar to J² and the mandrel V, is furnished with and considered a part of the outfit.

Having thus described my invention, what I claim is—

1. In a reamer for wells, the combination of the expansible bit, a mandrel for expanding said bit, suitable means for projecting said mandrel consisting of the toggle bars, one of said bars being composed of the telescoping sections and having a spiral spring surrounding said sections for forcing them apart, substantially as explained.

2. In a reamer for wells, the combination of the expansible bit, the mandrel for expanding said bit, a plate for limiting the movement of said bit, toggle bars for projecting the mandrel, one of said bars being composed of the telescoping sections, a spiral spring surrounding said sections for forcing them apart, and a trigger for controlling said toggle bars, substantially as set forth.

PATRICK H. MACK.

Witnesses:

BEN R. HAGAR,
E. C. HEATHCOTE.

**Defendant's Exhibit U. S. Patent to Palm No.
563,054.**

[Endorsed]: U. S. Dist. Ct., So. Dist. of Cal., So. Div. In Equity—No. 1540. Union Tool Company et al. vs. Wilson & Willard Mfg. Co. "Defendant's Exhibit U. S. Patent to Palm No. 563,054." Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit U. S. Patent to Palm No. 563,054. Filed May 8, 1917. F. D. Monckton, Clerk.

UNITED STATES PATENT OFFICE.

GEORGE PALM, OF BUTLER, PENNSYLVANIA.

APPARATUS FOR JARRING CASINGS IN ARTESIAN WELLS.

SPECIFICATION forming part of Letters Patent No. 563,054, dated June 30, 1896.

Application filed February 3, 1894. Serial No. 498,998. (No model.)

to whom it may concern:

Be it known that I, GEORGE PALM, a resident of Butler, in the county of Butler and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Jarring Casings in Artesian Wells; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to apparatus for jarring casings in Artesian wells, its object being to provide apparatus for loosening the casing, and, if necessary, lifting the same, such apparatus can easily be lowered into the casing and then caused to engage with the interior face thereof and to hold firmly the same while the tools are jarred upwardly until the casing is loosened from the surrounding body of broken and powdered rock holding the same within the well, and then, after the loosening of the casing, to provide for the withdrawal of the engaging devices or jaws from the wall, so that the apparatus may be withdrawn from the well.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a longitudinal section of a well, showing the apparatus therein in full lines. Fig. 2 is a like view showing the apparatus in section and also showing it engaging with the tubing—that is, in the jarring position, Fig. 3 is a side view of the tool at right angles to Fig. 1. Fig. 4 is an enlarged sectional view of the lower portion of the tool, illustrating the same in position for withdrawal from the well. Fig. 5 is an enlarged sectional view of the tool, showing the parts in the position in which they are withdrawn from the well. Fig. 6 is a cross-section on the line 6 6, Fig. 4; and Fig. 7 is a cross-section on the line 7 7, Fig. 4.

Like letters of reference indicate like parts in each view.

In the drawings, *a* represents the tubing within the well *a'*, and *b* is the jarring-tool which is connected by a threaded joint with the lower end of the string of tools within the well, such as with the lower end of the drill-rod, as at *c*. The tool *b* has the inclined faces *d'* over which the jaws *d* move, as is

more particularly shown in the section Fig. 7, the jaws being held to the inclines of the tool-body by means of dovetails or like sliding connections, so that they can slide down 55 the inclines and engage with the interior of the tubing or casing *a*. It will be noticed that the jaws have biting-faces, the inclines of the teeth of which extend upwardly, so that they will take into the tubing as the tool is 60 raised, and consequently will act to give a strong hold of the tool upon the tubing when the tool is drawn upwardly, but will have no biting action as the tool is lowered. Below the inclines *d'* of the tool is the annular portion *e*, which incloses the spring-operated 65 bar or support *f* within the central bore *e'* thereof, this spring-operated bar carrying at the upper end thereof the cross-head *f'*, which extends out through longitudinal slots *d²*, extending from the central bore of the tool 70 through the inclines *d'* of the tool, so that the cross-head *f'* may engage with and hold up the jaws *d*. The bar *f* has the enlarged upper end *f²* fitting within the central bore 75 and centering the bar therein, and the central bore is reduced at the lower end so as to fit around the main body of the bar. Surrounding the bar *f*, within the central bore *e'*, fitting against the shoulder *e²* at the top of 80 the reduced portion *e³* of the central bore, and pressing against the enlargement *f²* of the bar is the spring *g*, which acts to raise the bar *f* and through its cross-head *f'* raise the jaws *d*. Two operations are required 85 for this bar, one that it shall be held down and the spring *g* compressed when the tool is lowered within the well, so leaving the jaws *d* free to slide on the inclined faces *d'* and engage with the casing, and the other 90 that when the tool is being withdrawn from the well after its function of jarring the tubing or casing loose has been accomplished the spring *g* shall operate to raise the bar and hold up the jaws, so that contact of the jaws 95 with the inner wall of the casing is prevented. For this purpose I employ two latches or spring-locks. The upper spring-latch *h* engages with a seat *h'* of the bar above the spring, the latch *h* in its normal position being 100 withdrawn so that it does not engage with the bar, and for that purpose a spring *i*, fit-

ting around the latch within the seat h^2 thereof in the body of the tool and pressing against a head on the latch so as to withdraw it from the course of the bar, a suitable opening h^3 being formed in the cap or plate h^4 , which holds the latch in place, so that by any suitable tool the latch h can be forced inwardly to engage with the seat h' in the bar, and before the tool is lowered into the well, by means of the cross-head f' , the bar f is forced downwardly until the seat h' is in line with the latch h , and the latch h is then pressed inwardly into the seat h' , when the force of the spring g pressing against the latch-head holds it in the seat, and so holds the bar f down away from the jaws d . Near the lower end of the bar f is the seat k , and, as shown in Fig. 6, in the lower part of the tool is the spring-latch l , which is forced inwardly toward the bar by the spring l' , this spring-latch being preferably of the form shown in Fig. 6, that is, of forked shape, so that it extends on each side of the bar, and fits in seats l^2 provided therefor, the ends of the latch extending through the body of the tool, so that in forcing the bar f downwardly the spring-latch l may be forced out of its way so as to permit the shoulder k' on the bar f above the seat k to pass the spring-latch or stop l , it being shown in that position in Fig. 4. The upper end of the seat k is inclined so as to force the spring-latch l out of the way, and, as a result, when the bar is freed from the upper spring-latch h , it will be raised by the spring g and pass the spring-latch l , which then secures the bar in its raised position.

The body of the tool is preferably made in sections, the upper section m having the inclines d , and above the inclines the shoulders m' to limit the upward movement of the jaws d , and below the inclines the threaded extension n , which engages with a threaded socket p' in the lower section p , so providing for the screwing of the parts together and the insertion of the bar f within the socket or central bore e' of the tool. The two sections have any suitable angular or like places to provide for the screwing up, such as the angular portion r on the upper section m and the angular portion r' on the lower section p .

The operation of the tool is practically as follows: The tool is secured at the end of the string of tools, generally hanging below the drill-jars, being suspended above the same by the ordinary drilling-rope connected to the walking-beam. The operator forces down the bar f , drawing aside the latch l to let it pass downwardly, and lowering the bar until its seat h' comes in line with the upper latch h , when that latch is forced inwardly into the seat h' , and the pressure of the spring g against the latch holds it in place, and so holds the bar f in the position shown in Fig. 4 with the spring g compressed. He then lowers the tools into the well until the jar-

ring-tool reaches the desired position, the jaws sliding along the interior wall of the casing, but not holding thereto, as the incline of the teeth thereon is in an upward direction. When the tool reaches the desired position, the jaws d will of course slide down their inclines and bear against the casing. He then, through the walking-beam, gives upward jars to the tool, drawing the jaws upwardly by means of the walking-beam, so that they engage with the inner wall of the casing sufficiently to hold against dropping, and he lowers the walking-beam, so as to close the drill-jars, and raises it again, so as to give the upward jar and so force the jaws d into the tubing and cause them to hold fast thereto. He continues this upward-jarring action after the jaws of the tool have grasped the tubing, and by means of such upward-jarring action, through the jaws holding to the tubing, imparts an upward jar to the tubing, continuing this until he has jarred the tubing loose. In so doing, as the jaws d slide down the inclines d' they will strike against the cross-head f' of the spring-operated bar f and will compass the same, and as a result will overcome the pressure of the spring g , operating through the bar f , upon the upper latch h , leaving that latch free to be withdrawn by its spring h' , and therefore leaving the bar f free to rise within the tool and to follow up the movement of the jaws d . As soon as the tubing is jarred loose and the operation of loosening the same is completed, in order to withdraw the tool it is necessary to release the jaws from engagement with the tubing, and the operator then changes the movement and, through the drill-jars, imparts a downward jar to the tool, which forces the tool-body downwardly between the jaws d , holding to the casing, and, through the dovetail or like connections of the jaws with the tool, withdraws the jaws, and as soon as the jaws are thus withdrawn the spring-bar f , through its cross-head f' , raises the jaws d until they strike against the shoulder m and holds them in such raised position. As the spring-bar passes upwardly the lower end thereof is drawn up therewith until the seat k comes in line with the spring-latch l , when that spring-latch engages with the seat and holds it in its raised position, so forming a positive means for holding the jaws in their raised position, as shown in Fig. 5, so that as the tool is raised from the well, even if the teeth of the jaws should contact with the interior wall of the tubing, they cannot obtain any firm hold therein. The tool is then ready to be raised and can be drawn from the well.

The tool is thus made practically automatic in its operation when within the well, both to permit the engagement of the jaws with and the firm holding of the jaws to the tubing to be jarred, and, when that jarring operation is completed, to free the jaws and to raise them into such position that they can-

563,054

3

engage with the tubing, an efficient tool
is purpose being therefore provided.

What I claim as my invention, and desire
secure by Letters Patent, is—

In jarring-tools for tubing, the combination
of the tool-body having a single pair of in-
clined surfaces *d'*, the jaws *d*, the bar *f*, the
cross-head *f'* adapted to engage with said
jaws *d*, said cross-head working in the slots
in the tool-body, the spring *g*, a latch for

holding said cross-bar out of the way of said
jaws, the spring-latch *l*, said bar *f* having the
seat *k*, substantially as set forth.

In testimony whereof I, the said GEORGE
PALM, have hereunto set my hand.

GEORGE PALM.

Witnesses:

J. N. COOKE,

L. H. KNOX.

**Defendant's Exhibit U. S. Mentry Patent No.
647,605.**

[Endorsed]: U. S. Dist. Ct., So. Dist. of Cal., So. Div. In Equity—No. 1540. Union Tool Company et al. vs. Wilson & Willard Mfg. Co. “Defendant's Exhibit U. S. Mentry Patent No. 647,605.” Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit U. S. Mentry Patent No. 647,605. Filed May 8, 1917. F. D. Monckton, Clerk.

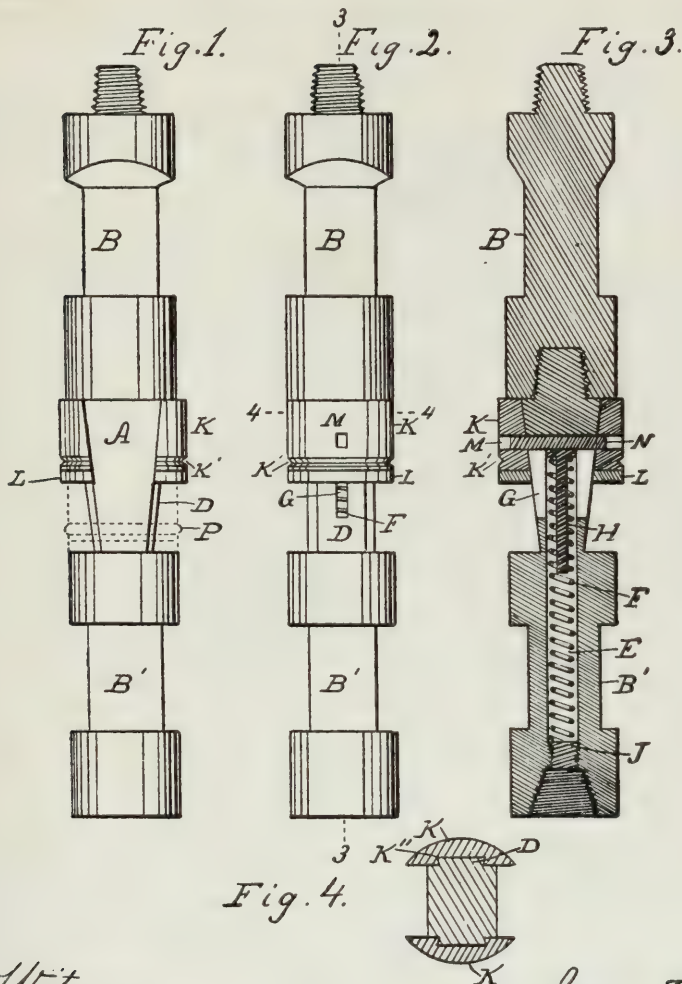
No. 647,605.

Patented Apr. 17, 1900.

C. A. MENTRY.
EXPANSION REAMER.

(Application filed Mar. 16, 1899.)

(No Model.)



Witnesses
M. M. Ginn
S. L. Benjamin

Inventor
Charles A. Mentry
By Hazard & Harpham
Attorneys

UNITED STATES PATENT OFFICE.

CHARLES A. MENTRY, OF NEWHALL, CALIFORNIA.

EXPANSION-REAMER.**SPECIFICATION** forming part of Letters Patent No. 647,605, dated April 17, 1900.

Application filed March 16, 1899. Serial No. 709,351. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. MENTRY, a citizen of the United States, residing at Newhall, in the county of Los Angeles, State of California, have invented a new and useful Expansion-Reamer, of which the following is a specification.

My invention relates to improvements in reamers for enlarging a well-hole; and the objects of my improvement are, first, to provide a reamer that will enlarge the well-hole below the casing when necessary, and, second, to provide a reamer which will straighten the hole in case the drill gets the hole out of perpendicular. I attain these objects by the mechanism described herein and illustrated in the accompanying drawings, in which—

Figures 1 and 2 are side views of my reamer and the shank thereof, the plane of one view being at right angles to that of the other. Fig. 3 is a central longitudinal section taken on line 3 3 of Fig. 2. Fig. 4 is a cross-section taken on line 4 4 of Fig. 2.

A is the reamer, and B is the shank thereof. They are preferably square in their centers, affording bearings for holding a wrench when being screwed together or taken apart. The frame B' of the reamer is provided with two inclined guide-lugs D, located on opposite sides thereof. These lugs are adapted to fit into the dovetailed grooves K" in the cutter-head K. In the reamer-frame B' is a central cylindrical opening E for the reception of the spiral spring F. This opening extends from the bottom of the reamer to the slot M at the top thereof. It forms a housing for the spiral spring F. Dropping into this spring, at the top end thereof, is the spring-actuated pin H, the head of which rests on the upper end of the spring and forms a bearing for the upper end of the spring. This pin will keep the spring in proper alinement and prevent it from collapsing when depressed. The head of this pin will at all times be spring-pressed against the square pin N, keeping it in its normal or elevated position. This pin N forms a connection between the cutters K, mounted on either side of the reamer, into one of which the pin is tightly driven and rigidly held, and in the other it has a working fit. This will permit the two halves of the cutter-head on opposite sides of the frame to ap-

proach and recede one from the other as they move up or down in the inclined guideways. This pin passes through the transverse longitudinal slot G and has a vertical movement therein.

J is a screw-threaded plug screwed into the bottom of the opening E and forms the bottom bearing for spiral spring F.

K are semicircular cutter-heads located one on each side of the reamer-frame and provided with dovetail grooves K" to receive the dovetail guide-lugs D, on which they have a vertical movement. These cutter-heads are provided with cutting-plates L, lying beneath the cutter-heads and detachably affixed thereto in any suitable manner. The cutter-heads are preferably made of iron and the cutter-plates of steel, so that the cutter-plates can be taken off, tempered and sharpened, or renewed, as the wear comes principally on the bottom.

Instead of the two cutter-heads one may be used, in which case the inclined guide-lug (upon which it work vertically) should be made larger and stronger. The cutter-head has formed in its outer side a groove K' to receive a wire or cord P (shown in dotted lines in Fig. 1) to bind and hold the cutters in their lowest and contracted position, which position they must be in when the reamer is being lowered through the pipe into the hole. This wire will be broken as soon as the bit strikes the bottom or when the cutter strikes any obstacle in the well, releasing the cutter-head and permitting the spring F to force the cutters upward into their elevated and expanded position, as shown in full lines in the drawings, its depressed or contracted position while tied being shown in dotted lines in Fig. 1.

It will be observed that the extent to which the reamer will enlarge a hole depends on the distance one from the other of the inclined guide-lugs D at the upper end thereof. The distance of said lugs one from the other at their extreme lower end should be such that when the cutters are at their lowest position there is a clearance-room in the pipe between the outside of the cutter-head and the inner wall of the pipe for the passage therethrough of the cutter-head. The lugs could be made separate from the frame and fastened thereto

by screws or bolts; but I prefer to make the lugs integral with the frame. The cutters in their normal elevated position will project outside of the outer line of the casing or pipe and can be withdrawn from the well only when in their lower or contracted position, which position they are crowded into as they are drawn up against the bottom of the casing in being drawn from the well.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The herein-described expansion-reamer, comprising the frame B' provided with inclined guide-lugs D on either side thereof, transverse longitudinal slot G providing clearance-way for the pin N in its vertical movement, and provided also with longitudinal slot E for receiving the spiral spring F; spiral spring F in the slot E; spring-actuated pin H in said spring and depending from the top thereof; plug J screwed into the bottom of slot E forming the bottom bearings for said spring; cutter-heads K having groove K" adapted to fit on the inclined guide-lugs D; transverse slot M for the reception of the connecting-pin N; the connecting-pin N adapted to fit firmly into the slot M in one cutter-head and have a working fit in the slot in the other cutter-head; detachable cutter-plates L below the cutter-head; the said reamer being provided with means at the top for its attachment to the shank, and means for attaching a drilling-bit at the bottom, substantially as described.

2. The combination in an expansion-reamer with the frame B' provided with inclined dovetailed guideways D and having a central longitudinal slot E for the reception of the spiral spring F and a transverse longitudinal slot G at the top of the slot E, of the spiral spring F in slot E and adapted to support the pin H, the head of which forms the upper bearing for said spring; the spring-actuated pin H below the connecting-pin N and arranged to exert an upward impulse thereto; the connecting-pin N, one end being tightly held in one cutter-head and having a working fit in the other cutting-head; the cutter-heads K provided with grooves K" to fit on the guide-lugs D, opening M for the connecting-pin N, and also with wire-receiving grooves K' in the exterior thereof; binding-wire P adapted to fit into groove K' and hold the cutter-heads in their depressed and contracted position; 55 cutter-plate L beneath the cutter-heads and detachably affixed thereto; plug J screwed into the bottom of the slot E and forming the bottom bearing for the spiral spring F; and binding-wire P adapted to hold the cutter-heads in their depressed and contracted position, substantially as shown and described.

I witness that I claim the foregoing I have hereunto subscribed my name this 8th day of March, 1899, at Los Angeles, California.

CHARLES A. MENTRY.

Witnesses:

G. E. HARPAM,
M. MCGINNIS.

**Defendant's Exhibit U. S. Sullivan Patent No.
79,276.**

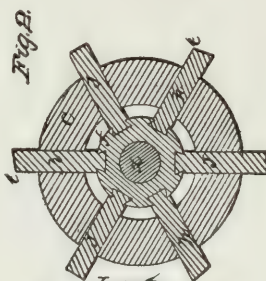
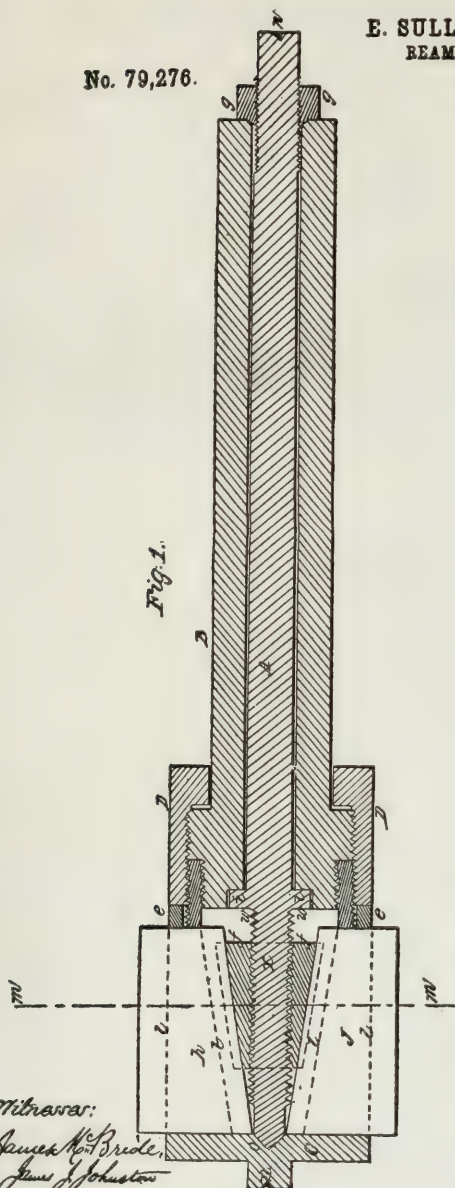
[Endorsed]: U. S. Dist. Ct., So. Dist. of Cal., So. Div. In Equity—No. 1540. Union Tool Company et al. vs. Wilson & Willard Mfg. Co. “Defendant's Exhibit U. S. Sullivan Patent No. 79,276.” Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit U. S. Sullivan Patent No. 79,276. Filed May 8, 1917. F. D. Monckton, Clerk.

E. SULLIVAN.
REAMEB.

Patented June 23, 1868.

No. 79,276.



Mittrassar:
James M. Bride,
James E. Johnston

Inventor:
Edward Sullivan

UNITED STATES PATENT OFFICE.

EDWARD SULLIVAN, OF PITTSBURG, PENNSYLVANIA.

Letters Patent No. 79,276, dated June 23, 1868; antedated June 6, 1868.

IMPROVEMENT IN REAMERS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, EDWARD SULLIVAN, of Pittsburg, in the county of Allegheny, and State of Pennsylvania, have invented a new and useful Improvement in "Graduating-Reamers;" and I do hereby declare the following to be a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of my invention consists in the combination and arrangement of a number of parts, the whole making a reamer, the cutters of which can be graduated so as to bore holes of different diameters, and operating in the manner hereinafter described.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

In the accompanying drawings, making part of this specification—

Figure 1 is a longitudinal section of my improved reamers.

Figure 2 is a transverse section of the same, cut through line *m*, fig. 1.

In fig. 1, B represents a hollow shank, upon one end of which are formed two screw-threads, one of which is to receive the cutter-head C and the other to receive the sleeve D. *h* are the cutters, and J are the wooden blanks. A is a rod or stem placed within the shank B, and furnished at one end with the screw-thread *x*, to receive the cone *f*, and at the other end with a square head to receive a wrench, and with the screw-thread and nut *g*. *f* is a conical-shaped piece, for the purpose of holding the cutters and blanks. C is the cutter-head, through which the cutters and blanks project. *e* is a collar, and D is a sleeve for the purpose of holding the collar *e* up against the ends of the cutters and blanks.

The manner in which I construct my reamer is as follows:

I make the shank B of cast iron, and either core or bore the hole through it to receive the rod A. Upon one end of the shank B are formed the screw-threads to receive the cutter-head C and sleeve D. The cutter-head I also make of cast iron, hollow, as shown by the dotted lines *l*, and with slots or mortises, which extend out through one end of the head to receive the cutters *h* and blanks J. Upon the open end of the cutter-head C, I form two screw-threads, one male and one female; the female to receive the end of the shank B, and the male to meet the male screw-thread on the shank B; and to receive the sleeve D, the collar *e* is made large enough inside to pass over the outside of the above-mentioned male-screw threads, intended to receive the sleeve D, which is made of cast iron, the collar *e* of wrought iron. The rod A and nut *g*, I make of wrought iron or steel, and terminate one end of the rod in a conical shape, which fits into the recess in the cutter-head C, as shown at the point marked *o*, for the purpose of keeping the rod in the centre of the reamer, and steadying the cutters. Upon the rod, at the point marked *w*, I form a collar, *i*, which fits into a recess in the end of the shank B, the use of said collar, when used in connection with the nut *g*, being to fasten the rod A when the cutters are set to the required position. The cone *f*, I make of wrong iron or steel, and on the inside of the hole, which passes through the centre of it, I form the screw-thread to receive the screw-thread *x* on the rod A, and upon its outside surface I form the dove-tail grooves to receive the cutters and blanks, which are fitted neatly into it, but with sufficient play to allow the cone to be moved back and forth by the rod A, for the purpose of regulating the cutters and blanks. The cutters I make of steel, and the blanks of hard wood, such as hickory or locust, and after fitting them into the cone and cutter-head, and putting all parts of the reamer together, I put the reamer into the turning lathe, upon the centres marked *n*, and dress them off true. I now file off the back of the cutters, as shown at the points marked *t*, so as to give them a cutting-edge. The blanks I leave as they come from the lathe, their purpose being to steady the reamer in the work.

The reamer is now finished and ready for operation, which is as follows:

Having the diameter given to which it is required to bore a hole, I unscrew the nut *g* upon the rod *A* and the sleeve *D* upon the shank *B*, and placing a wrench on the end of the rod, I turn said rod in the proper direction, and move the cone *f*, which moves the cutters *h* and blanks *J* to the required size. I now tighten the nut *g* upon the rod *A*, which draws the collars *i* up against the end of the shank *B*, and thereby prevent the rod *A* from becoming disarranged and moving the cutters and blanks. I now tighten up the sleeve *D* against the collar *e*, which comes against the cutters and blanks, which comes against the cutter-head *C*, and by this means bind the cutters and blanks firmly in their place.

The reamer is now ready for use, and is applied to the work in the same manner as the ordinary reamer and "rose-bit," the application of which is well known to the skillful workman, and therefore not necessary to be described.

I wish it understood I do not confine myself to any particular size or proportion, or the kind of material used in the construction of my improved reamer, for the same may be varied to suit the judgment of the mechanic making and using it, and the same general result obtained.

Having thus described the nature, construction, and operation of my improvement, what I claim as of my invention, is—

The combination and arrangement of the cutters and blank-head *C*, collar *e*, sleeve *D*, cone *f*, rod *A*, and the cutters and blanks, the whole being constructed, arranged, combined, and operating substantially as herein described and for the purpose set forth.

EDWARD SULLIVAN.

Witnesses:

JAMES J. JOHNSTON,
JAMES MCBRIDE.

Defendant's Exhibit U. S. Lloyd Patent No. 344,744.

[Endorsed]: U. S. Dist. Ct., So. Dist. of Cal., So. Div. In Equity—No. 1540. Union Tool Company et al. vs. Wilson & Willard Mfg. Co. “Defendant's Exhibit U. S. Lloyd Patent 344,744.” Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit U. S. Lloyd Patent No. 344,744. Filed May 8, 1917. F. D. Monekton, Clerk.

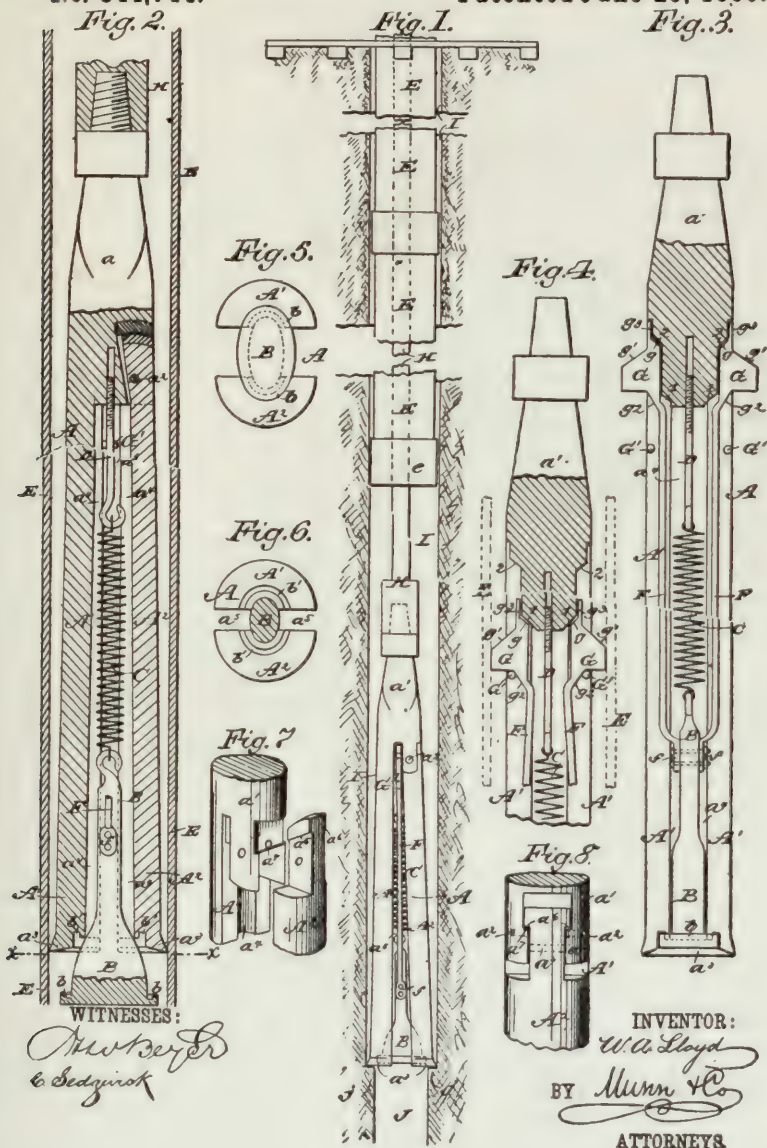
(No Model.)

W. A. LLOYD.

BEAMING TOOL FOR USE IN SINKING BORED WELL CASINGS.

No. 344,744.

Patented June 29, 1886.



UNITED STATES PATENT OFFICE.

WILLIAM ALEXANDER LLOYD, OF MACKSBURG, OHIO.

REAMING-TOOL FOR USE IN SINKING BORED-WELL CASINGS.

SPECIFICATION forming part of Letters Patent No. 344,744, dated June 29, 1886.

Application filed October 5, 1885. Serial No. 179,031. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ALEXANDER LLOYD, of Macksburg, in the county of Washington and State of Ohio, have invented a new and Improved Reaming-Tool for Use in Sink-

ing Bored-Well Casings, of which the following is a full, clear, and exact description.

My invention relates to reaming-tools adapted to ream out bores made in the earth by solid drills or tools passed through the inside of the partly-sunk casings of oil or Artesian wells, and so that said bores may be enlarged to the full exterior diameter of the casings, to allow the latter to be sunk as the boring proceeds.

The object of the invention is to facilitate this work by providing a simple, readily-adjustable, and effective expansible tool of improved construction, by using which the well-casing may be sunk to shut out surface or drainage water without allowing the earth to cave in, and permitting a boring and casing of the well at a considerable saving of time and labor over other means of performing the work.

The invention consists in certain novel features of construction and combination of parts of the reaming-tool, all as hereinafter fully described and claimed.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a central vertical section of a bored well with the casing applied and partly broken away, and shows also in side elevation my improved reaming-tool as at work in the well. Fig. 2 is a vertical sectional elevation of the reaming-tool in larger size and showing it in its contracted condition, as when passing through the well-casing, which latter is shown in section. Fig. 3 is a sectional elevation of the reaming-tool taken at right angles to Fig. 2, and showing the tool-expanding head raised to expand the cutters, as when the tool is in use. Fig. 4 is a sectional elevation of the upper part of the reaming-tool and shows the adjustment of the expander-catches when the reaming-tool is contracted to pass through the well-casing, which is shown in dotted lines.

Fig. 5 is a view of the lower or cutting end of the tool when expanded for use. Fig. 6 is a view of the cutting end of the tool when contracted, and shows the expander-head in section on the line $x\ x$, Fig. 2; and Figs. 7 and 8 are detail views of the joint of the hinged jaw with the head of the tool.

The letter A indicates the reaming-tool, the body of which is formed in two main parts, the part of jaw A', with which the head a' of the tool is formed, and the jaw A², which is pivoted on a pin, a², to the head of the tool, and so as to swing toward and from the jaw A', to contract and expand the tool at its lower end, and the upper end of the jaw A² will preferably be fitted with a steel cap-plate to work on a steel facing-plate set into the head of the tool, and as indicated by the darkly-shaded section lines in Fig. 2. The lower ends of both jaws are dressed so as to provide the cutting-lip a³ on each jaw, and the lips are undercut at their outer faces for more effective action of the cutters. The upper extremity of the jaw A² is provided with shoulders a⁶, which incline downward and inward, and are adapted to catch upon correspondingly-inclined shoulders a⁷, formed in the tool-head a', if the pivot-pin a² and the spring (hereinafter mentioned) should break, and thus prevent loss of the jaw A² down the hole, and as will be understood from Figs. 7 and 8, the pin a², being shown broken and the shoulders a⁶ a⁷ in contact in Fig. 8. The downward and inward incline of the shoulders prevents easy slip of the head of the jaw A from the socket made for it in the tool-head a'. The inner faces of the jaws A² of the tool are recessed longitudinally, as at a⁴, and separated, as at a⁵, to give space for the expander, which is made with a head or block, B, tapered backward from its outer end and connected at its inner end to one end of a spring, C, the inner end of which is connected to the head a' of the tool, and preferably by attaching the spring to a screw eye or bolt, D, which is threaded into a hole in the head, so that the screw may be turned in or out to regulate the tension of the spring, the normal action of which is to draw the tapering head B upward between the opposite jaws A' A² of the tool, to throw the jaw A² outward

344,744

r expanding the tool. The tapered sides of the head B, which face the jaws A' A², (see Fig. 2,) are formed with upwardly-projecting lips b b', which lock into grooves b' b', formed at the ends of the jaws A' A², when the spring draws the head B fully upward, at which time the bottom face of the head stands above the sharp outer edges of the cutting-lips of the jaws, so as not to interfere with their effective cutting action. (See Figs. 1 and 3.) By the interlocking of the head B with the jaws A' at b b' the jaws will be held against further expansion, so as to cut the hole for the well-casing E to a uniform diameter.

Instead of the lips b, the head B may have half-dovetailed flanges, as indicated by the dotted lines in Fig. 2, and which will enter correspondingly-shaped recesses in the ends of the jaws A' A², and will have the same effect. It will be noticed that the tension of the spring C will hold the jaw A² up into its socket if the pivot-pin a² should break.

To opposite sides of the top of the expander-head B are fixed at f f' the elastic or spring metal rods F, F, which lie in the space a between the jaws A' A² of the tool, and at their upper ends are provided with the heads or catches G G, which have the inclined faces or shoulders g g, which are adapted to lock under opposite lower shoulders, 1 1, formed at the lower end of the head a' of the tool, as in Fig. 4, when the tool is contracted, and are adapted also to lock under opposite upper shoulders, 2 2, as in Fig. 3, when the tool is expanded. The upper edges of the catches G are beveled downward and outward, as at g', to force the catches and the expanding-head B to be lowered, and the catches to be forced inward, when the catches are brought against the lower end or shoe e of the casing E in withdrawing the reaming-tool from the casing.

The letters G' G' indicate pins or studs, which are fixed to the inner face of the tool-jaws A' in such positions that inclined faces g² of the opposite expander-catches, G G, will strike said pins and automatically force the catches inward, so as to lock their shoulders g' under the shoulders 1 1 of the tool-head a' to allow the tool to contract. It is obvious that these pins G' G' also will form rests for the catches G G should the expander-spring C or its connection D break, and thus will prevent loss of the expander down the hole when the tool is in use. Stems g³, on the upper ends of the catches G, form stops for the catches against shoulders on the head of the tool.

The letter H indicates the boring-bar, to which the head a' of the reaming-tool A is to be connected. The letter I indicates the full-size bore of the well, and the letter J indicates the smaller bore of the well, which is made by a drill entered through the casing E, in which bar J is to be enlarged or reamed out by the reaming-tool A, to allow the casing to be lowered into the bore of the well.

The operation is as follows: The well-bore

I will be made by suitable drills to any depth from the ground-surface to which it may be sunk without danger of the caving in of its side walls, which depth will vary with the nature of the strata of earth through which the drill passes, and the drill will be withdrawn, and the casing E will be lowered in jointed lengths, as usual, until within about ten feet of the bottom of the well-bore I, so as to give room for the operation of the reaming-tool A, which is about five feet long. As large a drill as may safely be passed through the inserted well-casing E, then will be fixed to the bar H and lowered through the casing to the bottom of the bore I, and will bore a hole, as at J, too small to admit the pipe E, and for as great a depth as permissible, without allowing the earth to cave in. This drill then will be withdrawn, and the reaming-tool A will be fixed to the boring-bar, and the expanding-head B will be forced outward by pressure on the catches G of the rods F, or otherwise, until the catch-shoulders g pass below or against the shoulders 1 of the head a' of the tool A, and so as to allow the jaw A² to be swung inward to contract the tool and at the same time admit the catches G within the casing, and so that the entire tool A may be passed downward through the casing. When the catches G pass below the shoe e of the casing, they will be pressed outward by the tension of the spring C as the expander-head B is drawn upward by the spring to expand the reaming-tool to the full diameter of the well-bore I, and the shoulders g of the catches G will rest on the shoulders 2 of the head a' of the tool as the lips b of the head B lock into the grooves b' of the tool-jaws A' A², to hold them expanded. The reaming-tool now will be operated by the boring-bar to cut away the side walls, of the bore J to the full size of the bore I for a safe depth, and the tool A then will be lifted by the boring-bar in the bore I, and the inclined ends or faces g' of the catches G will strike the end of the shoe e and force the catches and the retainer-head B downward, as in Figs. 2 and 4, so that the reaming-tool A may contract, so as to be drawn upward through the casing E. The casing now will be lowered again to within about ten feet of the bottom of the bore I, as before, and the boring at J will be resumed and the drill withdrawn, and the reaming-tool A will again be passed through the casing to enlarge the bore J, and the casing will again be forced downward, as before, and so on by successive stages will the casing be sunk into the earth, and without allowing the earth to cave in, so that the well may be bored and cased with economy of time and labor over other methods of performing the work, as there is little or no danger of losing the tools in the bores when the earth is prevented from caving in onto them.

It is evident that the shoulders 2 2 of the head a' of the tool are not essential to the suc-

cessful operation of the reaming-tool, as the locking of the lips *b* of the head B with the ends of the jaws A' A' will be a sufficient stop to limit the rise of the catches G as the expander is drawn upward by the spring C; but the use of the stop-shoulders 2 2 is preferred.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

10 1. The reaming-tool A, constructed with a fixed jaw, A', and a pivoted jaw, A², with ends formed as cutters and provided with shoulders 1 1 at its head *a'*, and an expander consisting of a tapering head or block, B, placed between the jaws A' A², a spring, as at C, tending to draw the head inward for expanding the tool, and catches, as at F G, fixed to head B, and having shoulders *g*, adapted to lock against the head-shoulders 1 1 to allow the jaw
20 A² to swing inward for contracting the tool, substantially as herein set forth.

2. In a reaming-tool, the pivoted jaw connected with the tool-head by a joint providing shoulders, as at *a*⁶ *a*⁷, on the jaw and head, respectively, substantially as specified, whereby should the jaw-pivot break the jaw will be retained by the tool-head, as set forth.

3. In a reaming-tool comprising a head, *a'*, a jaw, A', fixed thereto, a jaw, A², pivoted
30 thereto, and an expander consisting of a tapering head, B, and a spring, C, connected therewith, the combination, with the tool-head *a'*, the expander-head B, and the spring C, of the screw-bolt D, connecting the spring adjustably
35 to the head *a'*, substantially as herein set forth.

4. In a reaming-tool, the combination, with the cutter-jaws A' A², adapted for expansion, substantially as specified, and the expanding-head B, of catches G G, fixed to head B and formed with inclined edges or faces *g'*, substantially as and for the purpose herein set forth.

5. In a reaming-tool, the combination, with the cutter-jaws A A', and the expanding-head B, provided with catches G G, and arranged substantially as specified, of pins G' G', fixed in one of the jaws and acting to draw the catches inward, and also to prevent loss of the expander should its connections break, substantially as herein set forth.

6. In a reaming-tool, the combination, with the cutter-jaws A' A², and the expanding-head B, arranged substantially as specified, of lips *b* on the head, and slots *b* in the jaws, to which the lips are adapted, substantially as herein set forth.

7. In a reaming-tool, the combination, with the jaws A' A², and the expander comprising a spring-drawn tapering head, B, placed between the jaws, of catches G, held to head B and provided with shoulders *g*, and the head *a'* of the tool being provided with opposite shoulders, 1 1 and 2 2, substantially as herein set forth.

WILLIAM ALEXANDER LLOYD.

Witnesses:

SAMUEL BESS,

FRANK BESS.

**Defendant's Exhibit Hobart & Ahearn U. S. Patent
No. 439,275.**

[Endorsed]: U. S. Dist. Ct., So. Dist. of Cal., So. Div. In Equity—No. 1540. Union Tool Company et al. vs. Wilson & Willard Mfg. Co. "Defendant's Exhibit Hobart & Ahearn U. S. Patent No. 439,275." Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit Hobart & Ahearn U. S. Patent No. 439,275. Filed May 8, 1917. F. D. Monckton, Clerk.

200 Wilson & Willard Manufacturing Company

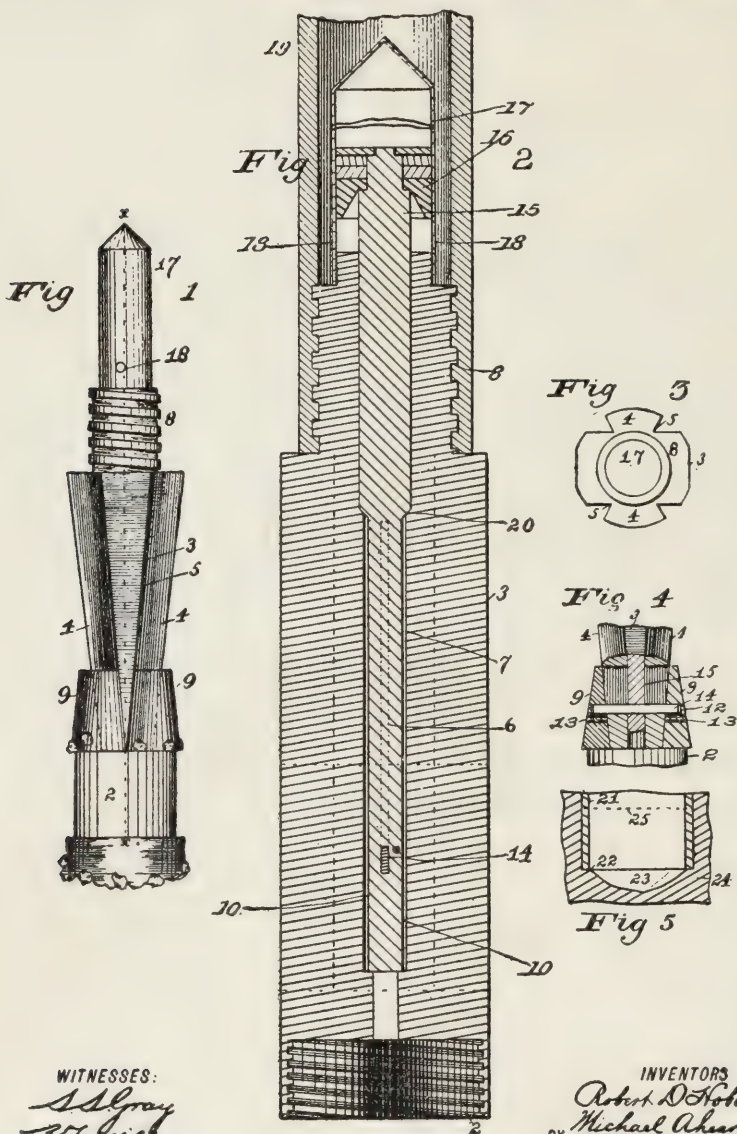
(No Model.)

R. D. HOBART & M. AHEARN.

ROCK DRILL.

No. 439,275.

Patented Oct. 28, 1890.



WITNESSES:

S. Gray
J. F. Wilson

INVENTORS

Robert D. Hobart
Michael Ahearn

BY *Wm. W. Dornick*
their
ATTORNEY

UNITED STATES PATENT OFFICE.

ROBERT D. HOBART, OF DENVER, AND MICHAEL AHEARN, OF
LEADVILLE, COLORADO.

ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 439,275, dated October 23, 1890.

Application filed November 12, 1888. Serial No. 290,556. (No model.)

To all whom it may concern:

Be it known that we, ROBERT D. HOBART, of Denver, in the county of Arapahoe, and MICHAEL AHEARN, of Leadville, in the county of Lake, and State of Colorado, citizens of the United States, have invented certain new and useful Improvements in Rock-Drills, of which the following is a specification, reference being had therein to the accompanying drawings, enabling any one skilled in the art to which the invention pertains to practice the same.

Our invention relates to an improved construction of rock-drills of that class or type wherein the drilling is effected by the use of rotating cutting or drilling edges; and its objects are to furnish a drill having a pair of expansible cutting-jaws, so that the diameter or bore of the hole drilled or being drilled may be enlarged at any desired point to such extent as is permitted by the amount of expansibility given such jaws, and so constructed, also, that these jaws may be instantly thrown into or out of operative position at will, such expansible and controllable jaws being combined, when desired or deemed necessary, with any of the ordinary types of non-expansible drill heads or points, the whole being of simple yet strong construction, efficient and reliable in operation, readily controlled and operated, and durable in use; to which ends the invention consists in the features, arrangements, constructions, and combinations more particularly hereinafter described and claimed.

In the drawings is illustrated an embodiment of our invention, wherein—

Figure 1 is a front view or elevation of our improved drill detached from the supporting tube or pipe; Fig. 2 an enlarged vertical section of the drill on line *x x*, Fig. 1, in position at the end of such tube or pipe; Fig. 3, a top view of the spindle or shank thereof; Fig. 4, a vertical section of a part of the drill, taken on a plane at a right angle to the plane of Fig. 2; Fig. 5, a vertical section of the bottom of a well and its tubular casing.

In the figures is represented a complete drill or operating any suitable drilling or cutting ring or disk or drill-points, the reference-num-

eral 2 indicating a socket for the reception and retention of such ring or disk, such socket being formed with or secured to the end of a shank 3, tapered upon two opposite sides, the tapers or inclines of such opposite sides being regularly inward from the top or some other point a little distance above the socket down to the socket. Upon these inclined or tapered sides are the ribs 4 4, extending down to or about down to the socket 2. Each is undercut as to both its side walls, as shown at 5, so that the tops of such ribs are wider than their bases, and longitudinally through the center of these slots and the body of the shank is formed a slot 6, for a purpose hereinafter noted.

At the top of the shank, and somewhat smaller than the body of the shank, is a screw 8 or other suitable fastening device, by which the whole drill-head is affixed to the tube 19, to extend to the exterior of the drilled hole for the conveyance of power and water to the head.

9 9 are the expansible jaws, two being used as giving from their location opposite each other on the inclined ribs 4 4 equal resistance in work on both sides of the shank, and hence greater steadiness thereto. Each should be curved on its exterior either as to all or part thereof, and should also incline inwardly on its exterior from its lower edge or point where its cutting devices are placed to give better clearance. Each has a longitudinal groove along its inner center or flat surface, such grooves being undercut, as shown, to correspond and fit upon the under-cuts of the ribs 4, whence it is evident that if the jaws 9 be slid from the top upon such ribs 4 they are locked thereto in rotary motion, but that horizontal or longitudinal movement of either the shank with its socket 2 or the expansible jaws 9 9 is permitted relatively to each other. These jaws are of such size that when lying, as they normally do, at the lower end of the shank and upon or as near to the socket as permitted, they will come within the area of the bore made by the drilling device carried by the socket and readily pass therethrough; but it is readily seen that if raised upon the inclined ribs 4 4 they will be thrown outwardly pro-

portionately to the incline of such ribs in the distance they are raised and ream or drill beyond the drilling limit of the ring or disk carried by the socket 2, and means for such raising will now be described. Through the center of the shank 3 is a longitudinal aperture 7, forming a guide and a seat for a piston-rod 15, carrying at its upper end a piston 16, provided with any customary or suitable packing, and situated within the cylinder 17, secured upon a reduced portion of the screw-top 8 by a male and female thread or by any other suitable means. The cylinder 17 extends upwardly within the tube 19 and is of a length somewhat greater than the amount of movement to be given to the expanding-jaws 9 9. Near its base one or more perforations 18 are made through its wall, whereby water may pass to its interior from the tube 19.

As before stated, a longitudinal slot 6 is made entirely through the ribs 4 4 and shank 3. In addition thereto a hole for the reception of a pin is made through the lower end or in the lower part of the piston-rod 15. In each jaw 9 a hole for the reception of a pin or screw 13 is made through its wall into its interior groove, and just above such hole a chamber or recess 12 is formed. The jaws 9 9 being placed upon the ribs 4 4 and the piston-rod 15 put in position, the parts are put in such relation that the holes for the pins or screws 13 13 and the one in the piston-rod and the slot 6 coincide or are in line, when a pin 14, of length about equal to the distance from the outer end of one chamber 12 to the outer end of the other, when the jaws 9 9 are in their normal or lower position, is passed through the holes and the slot, securing the jaws to the piston-rod. The piston-rod being then slightly raised, the pin 14 passes into the chambers 12, whereupon blind screws or pins 13 are placed in the holes therefor, extending inwardly nearly or quite to the piston-rod. The outer walls of the chambers 12 12 prevent the pin 14 from becoming detached from the jaws and piston-rod, while the blind screws or pins, as either is used, retain the pin within such chambers.

It should be noted that the parts should be adjusted so that when in normal position the piston 16 may not fall within the cylinder 17 below or even quite to the apertures 18, in order that water entering the cylinder shall always enter below the piston. The piston-rod should be so fitted to the aperture in which it works in the shank 3 that there may be an escape of water around the same, and that such escape shall be slower than the inlet through the perforations 18, that a pressure of water may be had within the cylinder 17 when necessary. To this end the contracted part of the piston-rod 15—that is, the part below the shoulder 20—is slightly smaller than the passage through the shank it takes in, a small passage 10 being thereby left around that part of the piston-rod. When the piston is raised to a sufficient height

within the cylinder 17 to throw the jaws 9 well out, the larger part of the piston-rod passes out of the aperture through the shank and the water escapes below the shoulder 20 and around the smaller part of the piston-rod.

Supposing it be desired to enlarge the bore of a drill-hole at any point of its length or its depth, the drill-head attached to the tube 19 is inserted therein to the proper point. Water under proper pressure is then admitted to the tube 19, and such proper pressure may be obtained by mere height of column, or, where such height of column is not attainable or the position of the tube will not give the pressure, by forcing or pumping water into the tube 19. Such water, with whatever pressure is given it, enters the cylinder 17 between the piston 16 and top of screw-head 8, forcing the former upwardly in the cylinder. As it rises it carries, through the medium of the piston-rod, the jaws 9 9 up the inclined ribs 4 4, so that their cutting devices are thrown outwardly beyond the plane of any cutting devices carried by a ring or disk in the socket 2 and operate on material beyond the drilling limit of the latter. Where a mere enlargement at some point is desired, a ring or disk in socket 2 need not be used; but where a well or drill-hole is to be deepened or a casing extended in a drilled well beyond a point at which the casing then extends, a drill ring, disk, or points should be used in the socket, that the bore may be kept uniform, a drill-head of size sufficient to pass through the well or its casing being used and the enlargement beyond that made by the use of the expansible jaws. So long as this requisite pressure of water is maintained the jaws will be kept in the elevated and outwardly-thrown or operative position; but so soon as such pressure is removed they will by their own gravity fall to their normal or inoperative position, so that they are readily controllable by the application of water-pressure to or the withdrawal thereof from the piston within the cylinder.

It is evident that the expanding-jaws and inclined ribs, instead of being kept in sliding engagement by regular inclined under-cuts or bevels, as shown, could be kept in such engagement by a groove on one part and a rib upon the other, similar or akin to a feather and spline. No matter, however, what means of keeping these parts in sliding engagement are used, it is readily seen that if the cutting or drilling edges of the expansible jaws take upon a ledge or shoulder of sufficient hardness within a well or drill-hole the resistance of such shoulder and the gravity of the head will cause the jaws to be thrown upward and expanded to enlarge the bore of the hole automatically and without the use of the piston and the water to act thereon. For instance, referring to Fig. 5, suppose 21 to be the casing of a drilled hole or well resting upon the shoulder or bottom 22 of the drill-hole. Usually a pocket 23 is formed either by the action

of water or other causes in the matter 24; but, whether such a pocket be formed or not, suppose it be desired to deepen such well or other drill-hole and so deepen it that the casing and bore may be of uniform size. In such case the casing is lifted to a short distance—for instance, to the dotted line 25—and the drill with the expansible jaws lowered. When the drill-head reaches the point below the line 25, the expansible jaws may be thrown out automatically by contact with the shoulder 22 and take thereupon, enlarging the bore, so that when desired the casing may be forced to the bottom of the addition of the well or drill-hole, or they may be thrown out by the action of the piston operated on by water admitted to its cylinder.

Having thus described our invention, what we claim is—

2 The combination, in a drill-head, of a shank

tapered on opposite sides and having ribs upon such tapered or inclined sides, expansible jaws located and adapted to slide upon such ribs, a piston-rod moving in an aperture in the shank of the drill-head and secured to the 25 jaws, a piston at the outer end of such rod, and a cylinder upon the end of the drill-head, within which such piston plays, and having inlets for water between the end of the drill-head and the piston, substantially as set forth. 30

In testimony whereof we affix our signatures in presence of two witnesses to each.

ROBERT D. HOBART.
MICHAEL AHEARN.

Witnesses to signature of Hobart:

Z. F. WILBER,
WILLIAM R. BARBOUR.

Witnesses to signature of Ahearn:

A. LYNCH,
JOHN K. RYAN.

Defendant's Exhibit U. S. Deisch Patent No. 526,440.

[Endorsed]: U. S. Dist. Court, So. Dist. of Cal., So. Div. No. 1540—In Equity. Union Tool Company et al. vs. Wilson & Willard Mfg. Co. "Defendant's Exhibit U. S. Deisch Patent No. 526,440." Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

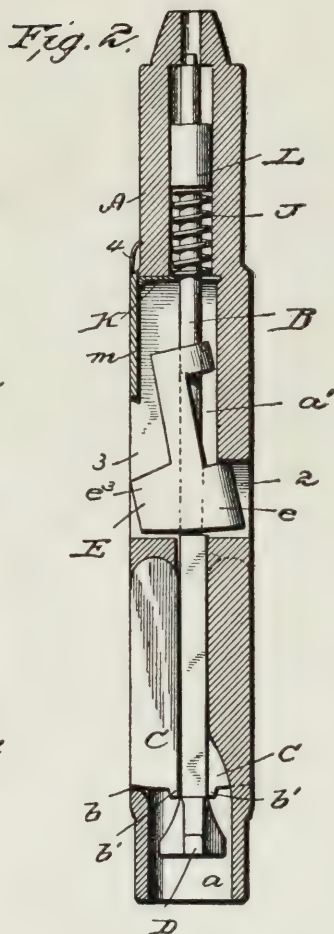
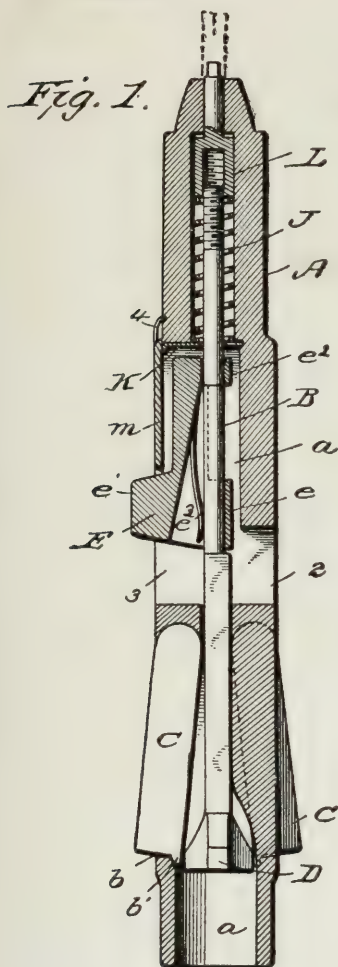
No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit U. S. Deisch Patent No. 526,440. Filed May 8, 1917. F. D. Monckton, Clerk.

(No Model.)

J. DEISCH.
WELL BEAMER.

No. 526,440.

Patented Sept. 25, 1894.



Witnesses
Wm. L. ...
E. R. ...

Inventor
John Deisch
Per Resat ...
Attorney.

UNITED STATES PATENT OFFICE.

JOHN DEISCH, OF WHITE LAKE, SOUTH DAKOTA.

WELL-REAMER.

SPECIFICATION forming part of Letters Patent No. 526,440, dated September 25, 1894.

Application filed May 31, 1894. Serial No. 513,093. (No model.)

To all whom it may concern:

Be it known that I, JOHN DEISCH, a citizen of the United States, residing at White Lake, in the county of Aurora and State of South Dakota, have invented certain new and useful Improvements in Well-Reamers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention aims to provide a reamer for enlarging the bore of Artesian and oil wells below the well tubing which will be automatic in its action expanding as soon as the bits clear the well tubing through which the tool is passed and again contracting on withdrawing the tool through the said tubing, the bits being locked in their expanded position to prevent their yielding when striking rock or gravel thereby insuring the removal of the latter and the enlargement of the bore to the limit of the cutting edges of the bits.

The improvement will be more fully set forth hereinafter and claimed and is shown in the accompanying drawings, in which—

Figure 1, is a vertical section of the tool showing the relative disposition of the parts when the bits are expanded and locked, and Fig. 2 is a view similar to Fig. 1 showing the position of the parts when the bits are withdrawn within the outer walls of the stock.

The letter A represents a stock constructed at its upper end to receive the operating rod and longitudinally bored to receive and permit of the free working of the rod B carrying the spreader head D. The lower portion *a* of the bore is enlarged sufficiently to receive the spreader head and admit of the same having a limited reciprocating movement therein. Longitudinal slots *b* extend through the sides of the stock and receive the bits C which come flush at their outer surfaces with the sides of the stock. The upper ends of the slots *b* are concaved to receive the rounded ends of the bits which articulate therein as the lower ends swing in and out. Shoulders or projections *b'* at the inner lower corners of the bits limit their outward movement by engagement with

the inner walls of the bar contiguous to the lower ends of the slots *b*. The upper portion *a'* of the bore is reduced or smaller than the bore *a* and has two diametrically disposed slots 2 and 3, the slot 3 being the larger to receive the locking head E and admit of its having a limited movement therein.

A projection or shoulder *e* of the part E is constructed to enter the slot 2 when the head E is at the lower limit of its movement and hold the spreader at its lowest position when the said locking head is pressed in laterally by the well tubing when passing the tool through the same either for removing or adjusting to place. The locking head is mounted on the rod B and the opening therein increases in width from the upper to the lower end to admit of the latter swinging laterally. One side is cut away forming the projection *e'* and the loop *e²*, the latter engaging with the shoulder on the rod B to cause the rod and the head to move up together. A spring *e³* exerts a lateral pressure on the rod B to hold the lower end of the locking head at the limit of its outward movement, so that the lateral extension *e'* will normally project beyond the side of the stock. The upper end of the extension *e* is beveled to glance the side on the lower end of the well tubing when the tool is withdrawn within the same. A coil spring J is fitted in the upper part of the bore *a'* above the slot and is mounted on the upper end of the rod B being confined between a plate K provided at the upper end of the slot 3 and sliding in ways or grooves on the sides thereof, and an adjustable stop on the threaded end of the rod B. The spring is normally compressed and has a tendency to move the rod B upward and its tension is regulated by adjusting the stop L which is effected by means of a key or wrench shown by the dotted lines in Fig. 1, which is fitted to the end of the stop and inserted through the further reduced bore of the stock. The upper portion of the slot 3 is closed by a slide *m* held in ways in the sides of the said stock and retained in place by a spring catch. There will be as many bits C as required and they will be distributed at proper intervals about the sides of the stock.

Normally the locking head and the rod with the spreader head, occupy the high

limit of the movement and the bits are expanded, being locked by the spreader head which is forced between their lower ends. To pass the tool through a well tubing of proper size to correspond with the diameter of the stock, the head E is moved to the limit of its lowest position in the slot 3. This operation moves the spreader head from between the inner ends of the bits and permits the latter to contract. After the tool passes below the lower end of the tubing so as to release the head E the latter moves laterally, and the spring J moves the rod B upward forcing the spreader head D between the lower ends of the bits and pressing the latter outward. On withdrawing the tool the projection *e'* of the locking head striking the lower end of the tubing moves the head down to the lower end of the slot 3, and laterally so that the projection *e* enters the slot 2. This operation moves the rod down and withdraws the spreader head from between the lower ends of the bits and permits the latter to contract or pass within the sides of the stock which is easily removed through the tubing. Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A tool for the purposes set forth comprising a stock, bits adapted to be projected beyond the sides of the stock, a spreader head for locking the bits in their expanded position, a rod attached to and carrying the

spreader head, a spring for normally retaining the spreader head between the ends of the bits, and a head mounted upon the said rod to move therewith and having a lateral extension normally projecting beyond the side of the stock, and having the opening through which the rod passes increasing in width from the top to the bottom end, to permit of the lateral movement of the said head, substantially as specified. 35 40

2. In combination a stock longitudinally bored, having slots *b* and 2 and 3 in its sides, bits fitted in the slots *b* and articulating with the upper ends thereof, the lower ends having stops to limit their outer movement, a spreader, a rod attached to the spreader, a spring mounted on the rod and arranged to normally hold the same at the limit of its upward movement, a head mounted on the rod and adapted to work in the slot 3, one side being cut away to form a loop *e* and a projection *e'*, the latter constructed to enter the slot 2, the opening in the head widening from the top to the bottom, and a spring in the head to bear laterally on the rod to project a lateral extension of the said head beyond the side of the stock, substantially as specified. 50 55 60

In witness whereof I affix my signature in presence of two witnesses.

JOHN DEISCH.

Witnesses:

M. E. LONG,

A. DOTY.

Defendant's Exhibit U. S. Yorke Patent No. 475,913.

[Endorsed]: U. S. Dist. Court, So. Dist. of Cal., So. Div. No. 1540—In Equity. Union Tool Co. et al. vs. Wilson & Willard Mfg. Co. “Defendant's Exhibit U. S. Yorke Patent No. 475,913.” Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit U. S. Yorke Patent No. 475,913. Filed May 8, 1917. F. D. Monckton, Clerk.

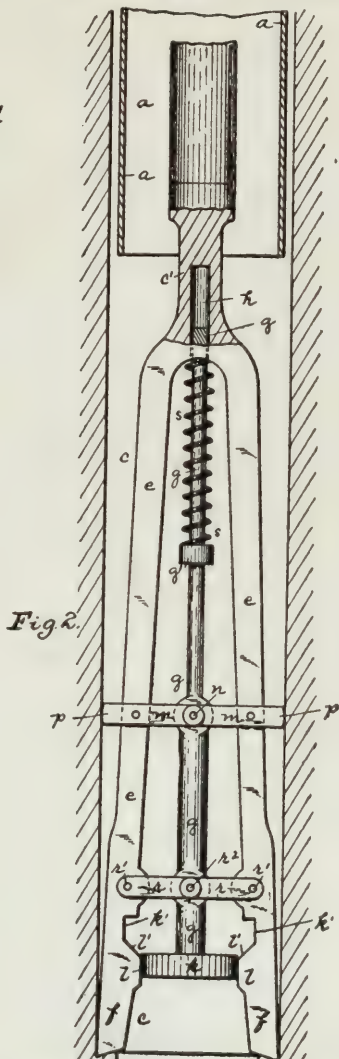
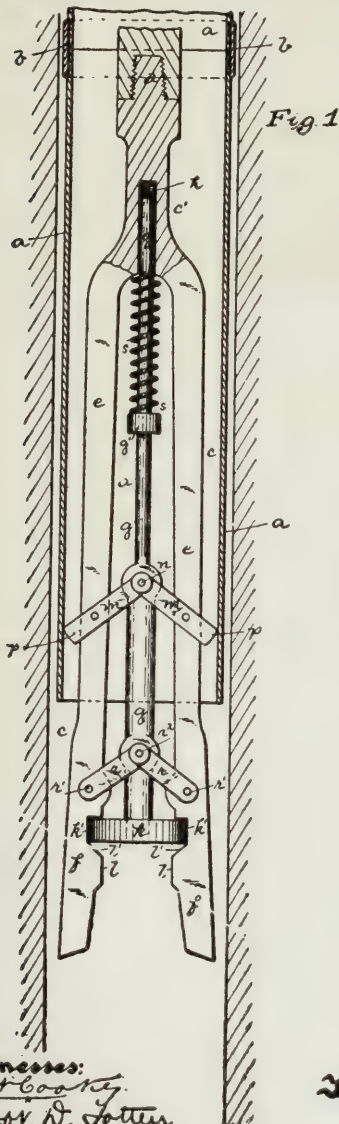
(No Model.)

P. YORKE.

APPARATUS FOR DRILLING ARTESIAN WELLS.

No. 475,913

Patented May 31, 1892.



Witnesses:
J. C. Cooley
R. D. Satter

Inventor: Patrick Yorke
By J. J. Gailard, Esq.
Attorney

UNITED STATES PATENT OFFICE.

PATRICK YORKE, OF WASHINGTON, PENNSYLVANIA.

APPARATUS FOR DRILLING ARTESIAN WELLS.

SPECIFICATION forming part of Letters Patent No. 475,913, dated May 31, 1892.

Application filed May 4, 1891. Serial No. 391,493. (No model.)

To all whom it may concern:

Be it known that I, PATRICK YORKE, a resident of Washington, in the county of Washington and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Drilling Artesian Wells; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to tools for drilling oil and other Artesian wells, its object being to provide what might be termed an "under reamer or tool" for drilling through tubing, which may be inserted in the well for the full diameter for which the well had heretofore been drilled by means of an expanding reamer, which can be inserted through the well-tubing and expanded below the same and then contracted so as to be withdrawn.

The present invention consists, generally stated, in certain improvements in such class of reaming-tools, as will be hereinafter fully described and claimed.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a view illustrating the manner of introducing the reamer into the well and passing it down through the tubing thereof and withdrawing the tool, and Fig. 2 is a like view illustrating the manner in which the tool is employed for under reaming.

Like letters of reference indicate like parts in both figures.

The well-tubing *a* is usually made in sections about eighteen feet in length, and is connected by threaded coupling sockets or collars *b*, screwed around the outer faces thereof, so requiring the bore of the well to be of a diameter sufficient to receive the tubing and the coupling-sockets, as shown. The ordinary well varies in different parts from thirteen inches in diameter to five and one-half inches, according to the different points at which a drilling operation is carried on and according to the number of lines of tubing within the well; but for the ordinary drilling it may be presumed that the well is of the full bore of thirteen inches. The under reamer

c has formed at its upper end a threaded pin *d*, by which it is connected to the ordinary string of tools within the well, such as to the drill-jars, and above that to the rope. The reamer is formed with the two arms *e e* extending down from the upper or body portion *c'* thereof and having formed at their lower ends reaming-bits *f f*, arms *e e* being spring-arms and being naturally adapted to spring out as soon as they are released by the mechanism hereinafter described. When so released, as shown in Fig. 2, the reaming-bits *f f* are adapted to extend out a sufficient distance to ream out the well to a diameter sufficient to receive the tubing—that is, in the illustration above referred to to a diameter of say of thirteen inches. When the tool is closed up, however, as shown in Fig. 1, the entire tool may be passed down through the tubing *a*, so that it may be inserted within the well and withdrawn therefrom when necessary. This is accomplished in the following manner: Sliding between the two arms *e e* of the reaming-tool is the central bar *g*, the upper end of which fits within the socket *h*, while its lower end carries what I have termed the "wedge" *k*, which wedge, when the tool is closed to pass through the tubing, fits into seats *k* in the arms *e e*, but which wedge, when it is lowered in the manner hereinafter described, is adapted to enter the space between the shoulders *l l* on the inner faces of the arms *e e* and hold the reamer open, expanding the arms a sufficient distance to enable it to ream out the well to the full diameter required, the wedge *k* being guided in its course from the seats *k* to between the shoulders *l* by the inclines *i*. If desired, the seats *k* may be dispensed with and the wedge *k* be made of smaller diameter while the shoulders extend in farther than illustrated, for some tools this being desirable in order to prevent the weakening of the arms *e*. The central bar *g* is connected to the arms *e e* by two sets of levers, the upper levers being hinged or pivoted to the bar at *n*, and their free ends *p* extending beyond the arms *e* in such position that as soon as the levers *m m* pass below the base of the line of tubing they may extend beyond it, as shown in Fig.

475,913

so as to permit the opening to the tool and the passage of the wedge *k* between the shoulders *l*, but said free ends *p* of said levers bearing upon the inner face of the line of tubing when the tool is lowered through the well, and so providing means for closing the tool when it is desired to withdraw the same from the well, the free ends of the levers striking against the base of the tubing and being forced inwardly and downwardly thereby, and so drawing upwardly the wedge *k* and drawing together the two arms of the reamer. Below said levers *m* and just above the wedge *k* I employ the links *r*, connected to the arms *e* at *r'* and to the bar *g* at *r*², said levers acting to limit the spread of the reaming-tool and acting with the wedge *k* to hold the same rigid during the reaming operation. In order to force down the central bar *g*, and so cause the opening of the tool as soon as the levers pass the base of the tubing, I employ a heavy spring *s*, confined around the bar *g* and between the top or body *c'* of the tool and the rear *g'* on the bar, which spring will act to force the bar *g* downwardly as soon as the free ends *p* of the levers *m* will permit the spreading of the tool, and will so act to force the wedge *k* between the shoulders *l*, said spring also acting to resist the heavy strain or jar which might come upon the tool in the reaming operation, and might act to cause the closing thereof by jarring the wedge *k* from between the shoulders *l*.

The invention may be practiced and the improved reaming-tool may be employed in different ways, according to the work to be done. For example, let it be supposed that a line of tubing has been carried down into a well the desired distance—such, for example, to cut off a vein of salt water—and that the driller encounters a strata of treacherous or caving rock and that he has difficulty in drilling through the same. In such cases, instead of working through the strata of caving rock and then putting in a second line of tubing, he would simply raise the tubing a sufficient distance to permit the reaming-tool to work under the said and hold the tubing in that position. He would then close together the reaming-tool and insert it within the tubing and permit it to pass down within the well. As it is passing down through the tubing the free end *p* will bear against the inner face of the tubing and hold the reamer in its closed position; but as soon as the levers *m* pass below the base of the tubing the spring *s* will force down the central bar *g* through the levers *m* and links *r*, extending the tool and at the same time forcing the wedge *k* between the shoulders *l* of the arms *e*, and so locking the tool in its extended position. By raising and lowering the tool in the ordinary operation the driller is then enabled to ream out the well to the full diameter sufficient to receive

the line of tubing, and he can continue to ream out the well until he gets below the difficulty encountered, such as until he gets below the caving rock, and at the same time he can protect his reaming-tool, or, for that matter, the drilling-bit, which can operate through the tubing by suspending the line of tubing sufficiently close to the tool to prevent any rock from falling in and clogging or wedging around the tool, and so locking it within the well. When it is desired to withdraw the reaming-tool from the well, it is only necessary to draw up thereon with sufficient pressure to overcome the force of the spring *s*, when as the free ends *p* of the levers *m* strike the lower end of the line of tubing they will be forced downwardly and inwardly and will force the central bar *g* upwardly, so as to compress the spring and withdraw the wedge *k* from between the shoulders *l*, so providing for the drawing of the tool within the tubing, and the free ends *p* of the levers *m* will hold the arms *e* of the reamer in their closed position, so that the reamer may be drawn through the tubing. If desired, the operator in starting his well may employ a smaller diameter of tubing and may tube or case his well continuously for any distance he may find desirable, simply drilling through the tubing, and then by means of the under reamer ream out the well to a sufficient diameter to receive the tubing and then lowering the line of tubing, adding section by section thereof at the upper end.

By my invention I provide for the drilling of all wells without the necessity of inserting a separate length of tubing extending from below any particular obstruction to the top of the well, as I am enabled to employ but one diameter and one line of tubing within the well. I am also enabled to drill the well by lowering the tubing, at the same time to hold back any caving rock which might act to clog or lock the tools within the well, so overcoming the danger of the loss of the tools or the loss of the well, and providing easy means of passing through any strata of caving rock encountered. I also reduce to a great extent the cost of drilling such wells by the saving in the cost of the tubing employed.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A reamer for Artesian wells, having two arms carrying bits at the lower ends thereof, a central bar longitudinally movable with relation thereto, and lever connections extending between and connected to said arms, said bar to provide for the closing and expanding of such arms, said levers having free ends adapted to extend beyond the arms of the reamer, substantially as and for the purposes set forth.

2. A reamer for Artesian wells, having two arms carrying bits, a central bar longitudinally movable with relation thereto and car-

475,913

rying a wedge at the base thereof, and the levers pivoted to said bar and arms and having the free ends extended beyond the arms, substantially as and for the purposes set forth.

- 5 3. A reamer for Artesian wells, having two arms carrying bits, a central bar *g*, longitudinally movable with relation thereto and carrying the wedge *k* at the base thereof, the levers *m m*, pivoted to said bar and arms and
10 having the free ends *p* and the links *r*, piv-

oted to said bar and arms near said wedge block, substantially as and for the purposes set forth.

In testimony whereof I, the said PATRICK YORKE, have hereunto set my hand.

PATRICK YORKE.

Witnesses:

J. N. COOKE,

ROBT. D. TOTTEN.

Defendant's Exhibit U. S. Allen Patent No. 294,302.

[Endorsed]: U. S. Dist. Court, So. Dist. of Cal., So. Div. No. 1540—In Equity. Union Tool Co. et al. vs. Wilson & Willard Mfg. Co. “Defendant's Exhibit U. S. Allen Patent No. 294,302.” Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams. Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit U. S. Allen Patent No. 294,302. Filed May 8, 1917. F. D. Monckton, Clerk.

(No Model)

O. ALLEN.
EXPANSIBLE DRILL.

No. 294,302.

Patented Feb. 26, 1884.

Fig 1



Fig. 2.

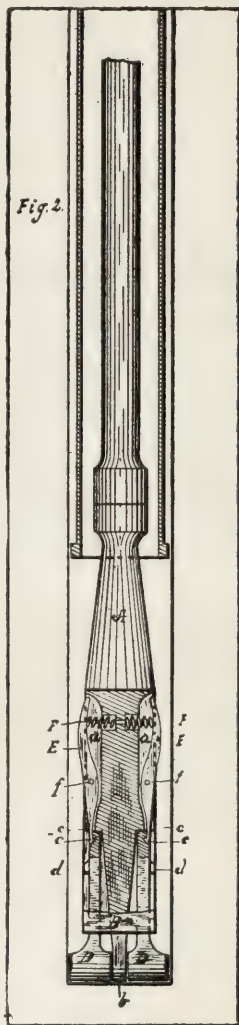
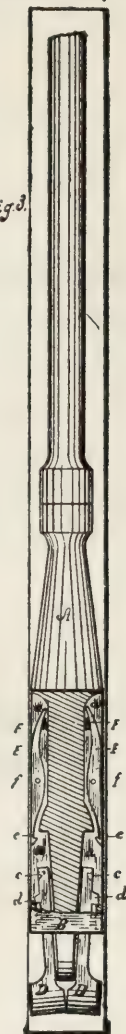


Fig. 3.



Witnesses

James Cohen
O. Allen

Inventor

Oren Allen
By a McNally
Attorney

UNITED STATES PATENT OFFICE.

ORREN ALLEN, OF DENVER, COLORADO.

EXPANSIBLE DRILL.

SPECIFICATION forming part of Letters Patent No. 294,302, dated February 26, 1884.

Application filed January 28, 1884. (No model.)

To all whom it may concern:

Be it known that I, ORREN ALLEN, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Expansible Drills, of which the following is a specification, reference being had herein to the accompanying drawings.

My invention relates to improvements in 10 expansible drills, in which the cutting part is made separable and adjustable; and the objects of my improvements are to provide a drilling-tool that can be compressed sufficiently to be lowered into wells through the casing, 15 and expanded sufficiently below the terminus of the casing to drill the well the same size of that containing the casing, which enables operators to bore wells a uniform size through any material that is capable of being pene- 20 trated by drills to any desired depth. These objects I attain by means of the device illustrated by the accompanying drawings, forming part of this specification, in which—

Figure 1 is a perspective view of the drill; 25 Fig. 2, a side and part sectional view, showing the tool expanded, as in use; Fig. 3, a side and part sectional view compressed, showing the tool in the position assumed while being raised or lowered through the casing.

Similar letters and figures refer to similar parts throughout the several views.

A in the drawings represents the main stem of the drill, having grooves *a a* therein, and having the guard B attached thereto. The 30 lower extremity of the stem A is pointed, as shown in the drawings at *b*.

In the grooves *a a*, and within the guard B, are placed supplemental drills D D, having the projections *d d* thereon, which prevent the sup- 35 plemental drills dropping below the position shown in Fig. 3, being the position assumed during the process of raising and lowering the tool through the casing. The upper ends of the supplemental drills have notches C made therein, which receive the catches E, 40 which serve the purpose of retaining the drills D D in the position shown in Fig. 2 while in operation. The catches E are pivoted in the grooves *a a* by means of the bolts *f*.

To the upper ends of the catches E are at-

tached springs F, as shown in Fig. 2, which hold outward the upper ends of the parts E in such a manner as to retain the catches in contact with the notches C C of the drills D D.

In the use of my invention, the drill, arranged 55 as shown in Fig. 3, is in position to be lowered into the well through the casing, which may extend down within a few feet of the bottom of the bore. When the supplemental drills reach the bottom of the hole, they spread apart 60 at their lower ends, which allows the part *b* of the main stem A to enter between the drills D D, forming a drilling-surface the same width of that part of the well containing the casing. (See Fig. 2.) The catches E engage with the 65 notches C, which retains the supplemental drills D D permanently in that position while the operation of drilling is being carried on. When it becomes necessary to raise the drill out of the well, the drill is raised upward by 70 any suitable means. When the upper ends of the parts E come in contact with the inner circumference of the casing, they are compressed inward, as shown in Fig. 3, which carries outward the catches, releasing the sup- 75 plemental drills D D, which allows them to drop downward into the position shown in Fig. 3, and which admits of their closing together in such a manner as to be drawn upward through the casing with ease. By this 80 means the impossibility heretofore experienced in continuing wells a uniform size through alternate strata of rock and quicksand or mud is entirely overcome.

Having thus fully described the construction 85 and use of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The hereinbefore-described expansible drill, consisting, substantially, of the stem A, having grooves *a a* made therein, and the guard 90 B, affixed thereto, as set forth, the supplemental drills D D, having-extensions *d d* thereon, and provided with notches C, the catches E, and spring F, all operating as described and specified, and for the purpose set forth. 95

2. The stem A, having grooves *a a* therein and guard B, attached thereto, as specified.

3. The supplemental drills D D, pointed at their lower extremities, and provided with notches C. 100

4. The catches E, fulcrumed between the sides of the stem A, by which the supplemental drills are sustained in position.

5 In an expansible drill, the combination, with the stem A, having grooves *a a* therein, and the guard B, attached thereto, as set forth, of the supplemental drills D D, as specified and described.

10 6. In an expansible drill, the combination, with the stem A, having grooves *a a* therein, and the guard B, attached thereto, and the supplemental drills D D, of the catches E E and springs F, all operating as described and specified.

7. In an expansible drill, a stem forming a drill, supplemental drills by which the cutting-surface is increased, suitable means of retaining the drills in position to penetrate rock or other materials, and suitable means of retaining the drill in position to be raised and lowered through the casing, as described and specified.

In testimony whereof I affix my signature in presence of two witnesses.

ORREN ALLEN.

Witnesses:

FRANK Q. STUART,
GEO. W. ALLEN.

**Defendant's Exhibit U. S. Carruthers Patent No.
479,933.**

[Endorsed]: U. S. Dist. Court, So. Dist. of Cal.,
So. Div. No. 1540—In Equity. Union Tool Com-
pany et al. vs. Wilson & Willard Mfg. Co. “De-
fendant's Exhibit U. S. Carruthers Patent No.
479,933.” Leo Longley, Special Examiner. Filed
Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas.
N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the
Ninth Circuit. Defendant's Exhibit U. S. Car-
ruthers Patent No. 479,933. Filed May 8, 1917. F.
D. Monekton, Clerk.

(No Model.)

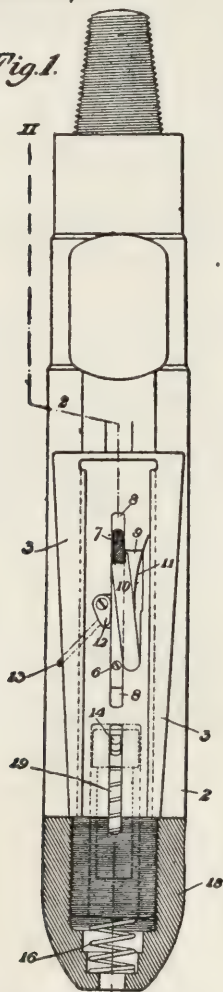
J. CARRUTHERS.
CASING SPEAR.

2 Sheets—Sheet 1.

No. 479,933.

Patented Aug. 2, 1892.

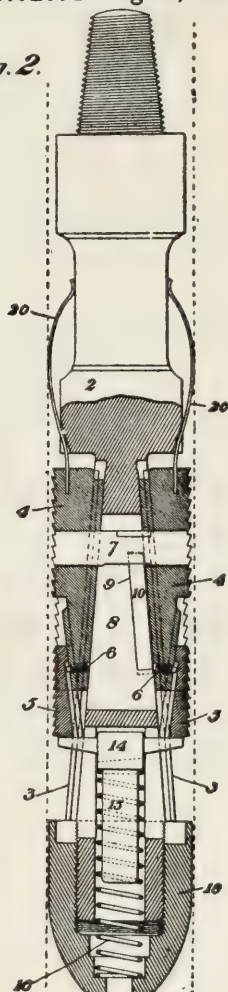
Fig. 1.



WITNESSES

A. L. Gill
C. Byrnes.

Fig. 2.



INVENTOR

John Carruthers
by H. Bakewell & Son
his attorneys

(No Model.)

J. CARRUTHERS.
CASING SPEAR.

2 Sheets—Sheet 2

No. 479,933

Patented Aug. 2, 1892.

Fig. 3.

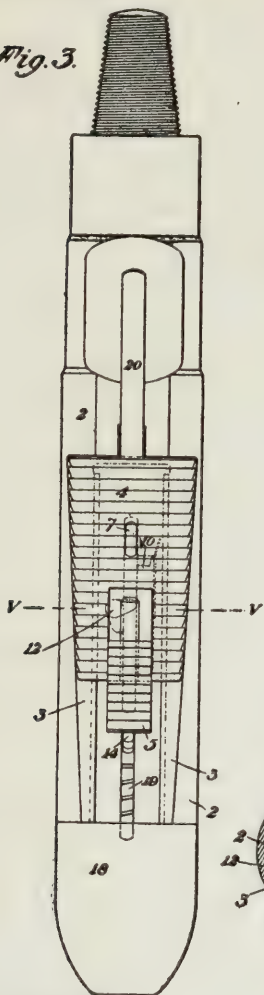


Fig. 4.

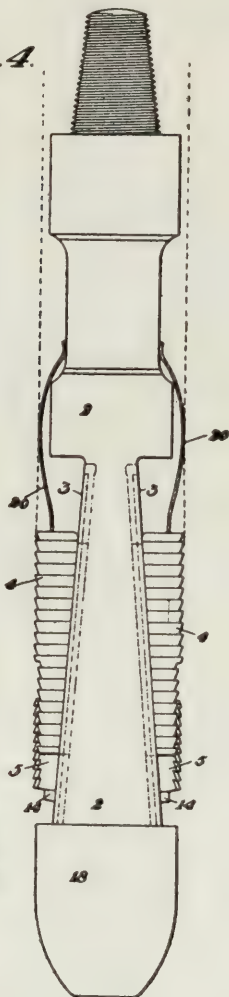
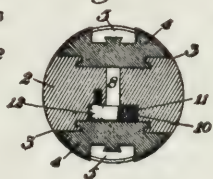


Fig. 5.



WITNESSES

H. L. Gill.
C. Byrnes.

INVENTOR

John Carruthers
by T. B. Baskin
his attorney

UNITED STATES PATENT OFFICE.

JOHN CARRUTHERS, OF HARMONY, PENNSYLVANIA, ASSIGNOR OF
ONE-HALF TO MYRON J. PETERS, OF SAME PLACE.

CASING-SPEAR.

SPECIFICATION forming part of Letters Patent No. 479,933, dated August 2, 1892.

Application filed April 18, 1892. Serial No. 429,562. (No model.)

To all whom it may concern:

Be it known that I, JOHN CARRUTHERS, of Harmony, in the county of Butler and State of Pennsylvania, have invented a new and useful Improvement in Casing-Spears, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

- 10 Figure 1 is a side elevation, partly in section, of my improved casing-spear, showing the same locked for withdrawal from the casing. Fig. 2 is a vertical sectional view on the line II II of Fig. 1. Fig. 3 is a side elevation
15 of the spear, showing in dotted lines the pawl withdrawn and the parts ready for lowering in the well. Fig. 4 is a side elevation at right angles to Fig. 3, showing the parts in position for jarring upwardly on the casing. Fig. 5 is
20 a cross-section on the line V V of Fig. 3.

- My invention relates to the casing-spears employed for the purpose of removing a casing from a well or for loosening it and permitting it to be shifted; and it consists in the peculiar construction and arrangement of the parts, as hereinafter more fully described, and set forth in the claims.

- In the drawings, in which like numerals indicate corresponding parts, 2 represents the body of the casing-spear, upon the inclined
30 slideways 3 3 of which are mounted the ribbed or barbed wedge-slips 4 4, moving in dovetailed grooves in said slideways. The barbs upon the slips 4 4 are upwardly directed, so
35 that they are adapted to bite on the casing when the spear is moved upwardly therein.

- 5 5 are barbed wedge-slips dovetailed in inclined slideways on the wedges 4 4 and limited in their downward movement by studs or
40 screws 6, which fit in inner grooves of said wedges. The barbs on the second set of slips are downwardly directed, so that they shall be adapted to engage the casing when the spear is moved down. The first set of slips 4
45 4 are connected by the cross-bar 7, which moves in the slot 8, extending between the slips, and pivoted in a recess 9 of the body is a pawl or latch 10, which is pressed outwardly by the spring 11. A trigger 12, mounted in
50 the body on the opposite side of the slot, is arranged to engage said pawl and push the

same back against the action of the spring by means of a rod passed through the hole 13, extending to the outside of the body. Bearing upon the lower ends of the slips 5 5 is a cross-head 14, supported upon a vertically-movable post 15, carried upon and supported by a spiral spring 16, which incloses the same and bears upon an annular shoulder on its upper portion. This spring at its lower end bears upon the bottom of the central recess of a cap 18, which is screwed upon the lower tubular end of the spear-body. The ends of the cross-head project through a second slot 19 beneath and in line with the slot 8 and bear upon the wedges 5, as above stated. To prevent the rubbing and wearing away of the teeth on the slips, I provide two springs 20, which are arranged to bear against the inside of the casing, which is indicated in dotted lines, and hold the slips out of contact therewith.

To operate the device, a rod is inserted through the hole 13 and the trigger pushed into the position shown by dotted lines in Fig. 3, thus disengaging the pawl 10. The slips 5 5 hang at the lower portion of their reciprocating path, and in this position their peripheries lie in a smaller circle than that of the upper wedges 4 4. The device being lowered within the casing at the end of a string of tools, the slips 4 4 move up in their inclined seats and permit its easy descent. When the portion of the casing which it is desired to seize has been reached, the operator jars upwardly on the tools, and in such upward jarring the slips 4 4 bite on the casing, and further lifting or upward jarring of the spear will move the casing. When the casing has been properly loosened or sufficiently raised in the well and it is desired to withdraw the spear therefrom, the operator jars down on the tool-stock. The effect of this is to loosen the slips 4 4 by the downward movement of the stock, to push aside the trigger by the cross-bar, and to thrust out the slips 5 5, which support the weight of the tools and are prevented from moving downward by the barbs thereon. The spiral spring serves to maintain a yielding pressure upon these slips. The slips 4 4, now resting upon the upper part of the slideways, are retracted and the spear may be withdrawn without difficulty

479,933

the teeth or barbs upon the slips 55 slipping over the casing, so that if the spear should dip they would bite on the casing and uphold the same.

The advantages of the device are obvious. The device is much simpler than other spears formerly used and is positive and certain in all its motions, while the blocks of wood heretofore inserted to hold up the wedges until the spear reached the proper position and the broken down by jarring are dispensed with.

claim as my invention—

In a casing-spear, the combination, with the tool-stock, of two contrarily-acting sets of wedge-slips, one set being mounted upon inclined guideways on the stock and the second set being mounted upon similar oppositely-inclined guideways upon the first set, and a pawl for locking the first set in retracted position, substantially as and for the purposes described.

In a casing-spear, the combination, with the tool-stock, of a set of wedge-slips mounted in inclined guideways thereon, a cross-bar connecting the slips and moving in a slot passing through the stock, a spring-pawl arranged to engage said cross-bar, and a second set of contrarily-acting wedge-slips mounted in reversely-inclined guideways upon the first set, substantially as and for the purposes described.

3. In a casing-spear, the combination, with the tool-stock, of a set of wedge-slips mounted in inclined guideways thereon, a cross-bar 35 connecting the slips and moving in a slot passing through the stock, a spring-pawl arranged to engage said cross-bar, a second set of contrarily-acting wedge-slips mounted in reversely-inclined guideways upon the first set, a 40 cross-head moving in a second slot passing through the stock, and a spiral spring surrounding the stem supporting said cross-head, substantially as and for the purposes described. 45

4. In a casing-spear, the combination, with the tool-stock, of a set of wedge-slips mounted in inclined guideways thereon, a cross-bar connecting the slips and moving in a slot passing through the stock, a spring-pawl arranged 50 to engage said cross-bar, a trigger arranged to engage the spring-pawl, a hole extending from said trigger to the exterior of the casing, and a second set of contrarily-acting wedge-slips mounted in reversely-inclined guideways 55 upon the first set, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 30th day of March, A. D. 1892.

JOHN CARRUTHERS.

Witnesses:

W. B. CORWIN,
H. M. CORWIN.

**Defendant's Exhibit U. S. Duncan Patent No.
662,895.**

[Endorsed]: U. S. Dist. Court, So. Dist. of Cal.,
So. Div. No. 1540—In Equity. Union Tool Com-
pany et al. vs. Wilson & Willard Mfg. Co. "De-
fendant's Exhibit U. S. Duncan Patent No. 662,895."
Leo Longley, Special Examiner. Filed Apr. 16,
1913. Wm. M. Van Dyke, Clerk. By Chas. N.
Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the
Ninth Circuit. Defendant's Exhibit U. S. Duncan
Patent No. 662,895. Filed May 8, 1917. F. D.
Monckton, Clerk.

No. 662,895

W. DUNCAN.
UNDERREAMER.

Patented Nov. 27, 1900.

(Application filed Apr. 4, 1900.)

(No Model.)

Fig. 1

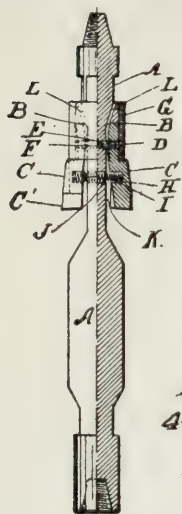


Fig. 2.



Fig. 3

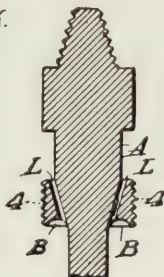


Fig. 4



Witnesses

Mc. Wilkins

H. H. Robbins

Inventor

Walter Duncan

by

Kay and Morpheus
Attorneys

UNITED STATES PATENT OFFICE.

WALTER DUNCAN, OF LOS ANGELES, CALIFORNIA, ASSIGNOR (ONE-HALF TO ANTHONY H. HEDLEY, OF SAME PLACE.

UNDERREAMER.

SPECIFICATION forming part of Letters Patent No. 662,895, dated November 27, 1900.
Application filed April 4, 1900. Serial No. 11,547. (No model.)

To all whom it may concern:

Be it known that I, WALTER DUNCAN, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Underreamers, of which the following is a specification.

My invention relates to improvements in reamers for enlarging a well-hole; and the objects of my improvements are, first, to provide a reamer that will enlarge the well-hole below the casing when necessary, and, second, to provide a reamer which will straighten the hole in case the drill gets the hole out of perpendicular. I attain these objects by the mechanism described herein and illustrated in the accompanying drawings, forming a part hereof, in which—

Figure 1 is a side view, partly in section and partly in elevation, of my reamer. Fig. 2 is a side view of the same on a plane at right angles to the plane of the view in Fig. 1. Fig. 3 is an enlarged longitudinal section of the upper part of the reamer-shaft. Fig. 4 is a cross-section on line 4 4 of Fig. 3.

A is the shaft or body of my reamer, the top of which is screw-threaded, so that it may be easily attached to the drill-stem, and in the bottom thereof is a screw-threaded socket whereby any suitable well-boring tool may be attached to the reamer when desired. The upper and lower portions of the body are preferably circular and of a size to snugly fit within the casing of the well being drilled, and thereby provide a suitable guide to keep the reamer perpendicular.

In each side of the lower part of the upper circular portion of the body are two semi-circular grooves B, one on each side thereof, to provide a bearing for the upper ends of cutters C, below which, as shown in Fig. 1, the body A is reduced in size for a short distance to provide clearance for the cutters C when the reamer is passing through the casing. The upper ends of the cutters fit into the grooves B. Near the upper ends of cutters C are holes D, through which and through hole E in body A and registering therewith when cutters C are in position passes pin F, which, with collar G, which screws onto body A and passes down over the

upper portion of the cutters, holds the cutters C in position attached to body A. Pin F has a loose fit in the cutters C and a tight fit in the body A and is kept in position by collar G. In the lower portion of cutters C and on the inner side thereof are sockets H for the reception of spiral spring I, which is seated therein and which passes through hole J in body A and keeps the cutters expanded when underreaming. It will be seen that when underreaming there is some little space K between the lower edge of the cutters C and body A and that this space increases until it practically runs out of the grooves B. This space under collar G might pack with debris if there were no upper outlet to the same. As drilling is always done with water in the hole, I provide channels which pass out of body A above collar G and furnish an outlet for the upper portion of space K, so that the debris may freely pass therethrough, and thereby avoid packing space K.

Around the lower edge of cutters C is a concave chamfer C' of such depth that when the cutters are pressed in against body A as the tool is passed down into the casing and the cutters are expanded to contact with the casing the upper edge of chamfer C' will contact with the casing, while the lower or cutting edge thereof will not be in contact with the casing, thereby permitting the tool to slide down to the bottom of the casing, and when the bottom of the casing is passed the cutters are further expanded by spring H, that the lower or cutting edge of the chamfer C' will contact with the rock or dirt of the well-hole below the casing and as the tool is raised and lowered will cut the same until the hole is underreamed to the full size. The expansion of cutters C, which is only required to be a little in excess of the size of the casing that is being used in the hole, in order that it may be pushed down more easily than if the dirt or rock touched the casing. Having described my invention, what I claim is—

1. The herein-described underreamer, comprising the body A, provided with grooves on each side thereof, and holes E and therethrough, and channels L therein; a

662,895

rs C, one on each side of body A near the
p thereof, said cutters having sockets H;
d holes D therethrough, and chamfers C'
the lower outer periphery thereof; spring
5 adapted to fit in said sockets and pass
rough hole J; pin F adapted to pass through
les D in the cutters, and hole E in body A,
d collar G adapted to screw on body A and
ep pin F in position, and to keep cutters C
om having too great expansion.

2. The herein-described underreamer, com-
prising a shaft, circular at the top and bottom
d reduced in size intermediate the circular
rtions, and having holes therethrough and
annels therein, as shown; a groove in each
le of the bottom of the upper circular por-
tions; cutters having upper circular ends
apted to fit in said grooves; said cutters
iving holes extending through the upper

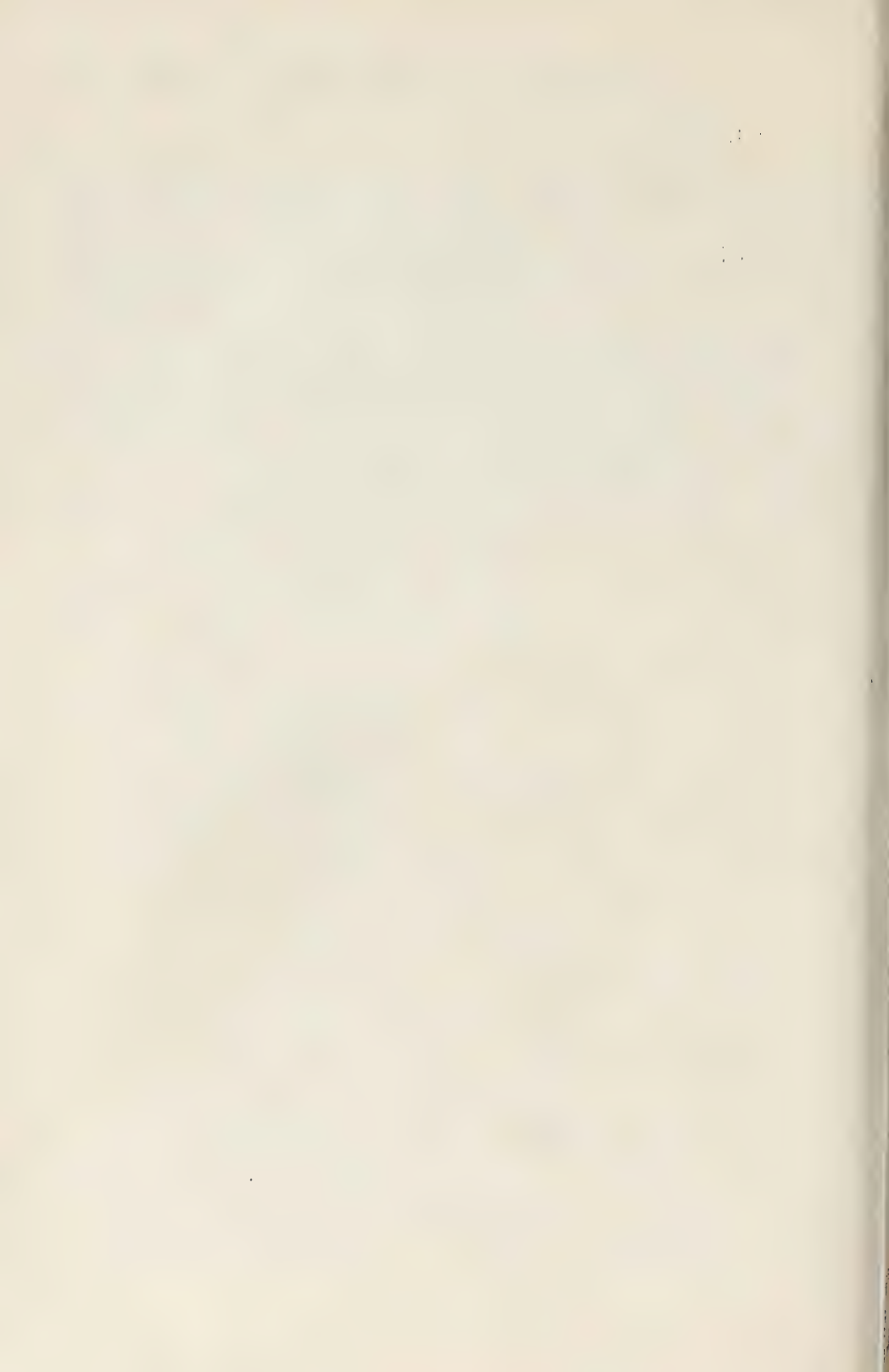
ends, and sockets in the lower ends on the 20
inner sides, and a chamfer around the outer
lower edges thereof; a pin extending through
a hole in the shaft and into the holes in the
upper ends of said cutters; a spiral spring ex- 25
tending through a hole in the shaft, and hav-
ing its ends housed in the sockets in the lower
ends of said cutters; and a collar adapted to
be screwed onto the upper circular part of
the shaft and to project over the upper por-
tion of the cutters. 30

In witness that I claim the foregoing I have
hereunto subscribed my name, this 28th day of
March, 1900, at Los Angeles, California.

WALTER DUNCAN.

Witnesses:

M. C. WILKINSON,
G. E. HARPHAM.



Union Oil Tool Co.

547 MATEO STREET

Largest Manufacturers of Up-to-Date

Oil Well Drilling and
Fishing Tools

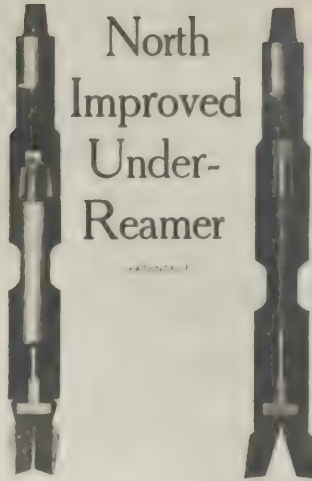
on the Pacific Coast

OUR SPECIALTIES

- Union Under-Reamers
- North Under-Reamers
- Union Ratchet Wire Rope Sockets
- Union Drilling Machines
- Union Wire Rope Knife
- Ideal Gas Engines, with reversible Clutch
- Pulleys for Cleaning Out and Pulling Rods and Tubing.
- Ideal Rig Irons

Ask Jobbers for "UNION" Tools They are
the Best on Earth

Los Angeles California



North
Improved
Under-
Reamer

Manufactured by

Union Oil Tool Co.

547 Mateo St., Los Angeles, Cal.

Telephone South 26

Case No. 2996

U. S. Circuit Court of Appeals
For the Ninth Circuit

Union Oil Tool Co. Circular of North American Under-reamers
MAILED - 8 1917

*at 212 West 6th, 250 West 6th, 250 West 6th
Union Tool Company et al. in County*

*-25-
Hilson & Hilliard, Mfg. Co. #15 H6*

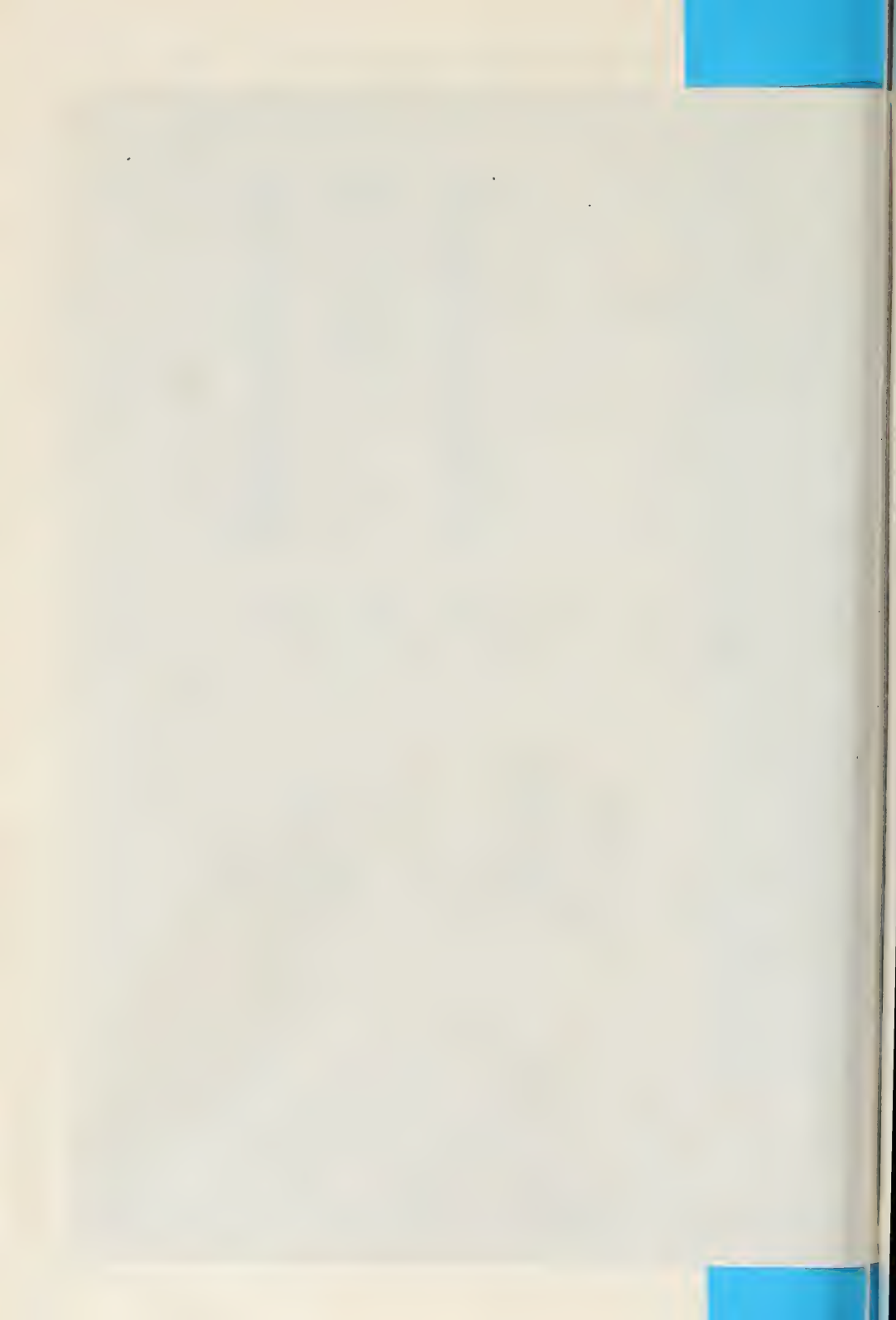
*Defendants Exhibit Union Oil Tool
Company's Circular of North
Improved Under-reamers*

*Leo Longley
Special Examiner*

FILED
APR 16 1913

M. M. VAN DYKE, Clerk
Deputy Clerk

DATE RECORDED, INDEXED AND NOTED
BY THE CLERK OF THE COURT
RECORDS, ROOM 1100, COURT HOUSE, SAN FRANCISCO, CALIF.



**Defendant's Exhibit Certified File Wrapper and
Contents Double Patent in Suit.**

Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk.
By Chas. N. Williams, Deputy Clerk.

UNITED STATES OF AMERICA,
DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all to whom these presents shall come, Greeting:

THIS IS TO CERTIFY that the annexed is a
true copy from the Records of this Office of the File
Wrapper and Contents in the matter of the

Letters Patent of

Edward Double,

Number 734,833,

Granted July 28, 1903,

for

Improvement in Underreamers.

IN TESTIMONY WHEREOF I have hereunto
set my hand and caused the seal of the Patent Office
to be affixed at the City of Washington, this 24th
day of October, in the year of our Lord one thousand
nine hundred and twelve and of the Independence
of the United States of America the one hundred and
thirty-seventh.

[Seal]

C. C. BILLINGS,
Acting Commissioner of Patents.

DIV. 38.

NUMBER (SERIES OF 1900).

80,144 1901 DIV. 25 38

Div'n. ~~XXV.~~ (EX'R'S. BOOK). 25-39

PATENT No. 734,833

Name—Edward Double

190 of Santa Paula,

County of

State of California,

Invention—Under-Reamer.

Division of App., No. PARTS OF APPLICATION FILED. , filed	ORIGINAL.		RENEWED.	
	Petition	Oct. 26, 1901	, 190	
	Affidavit	" " 1901	, 190	
	Specification	" " 1901	, 190	
	Drawing—2 shts.	" " 1901	, 190	
	Model or Specimen	None	, 190	, 190
	First Fee—Cash		, 190	, 190
	" " Cert. \$15	Oct. 26	, 1901	, 190
	App ^l . filed complete	" 26	, 1901	, 190

Examined—A. P. Shaw, Ex. Jan. 2, 1903 , 190

Countersigned—J. W. Babson , 190

1-3-1903 For Commissioner. For Commissioner. July 8, 1903

Notice of Allowance—January 5 , 1903 , 190

Final Fee Cash Cert. dated July 3 , 1903 , 190

" " Cert. \$20 July 8 , 1903 , 190

3 Patented July 28 , 1903

Associate Attorney Attorney—Townsend Bros.,

Potomac Block,

2 Bradbury Block,

Los Angeles, Cal.

Name Serial Number

Patent No. Date of Patent

CERTIFICATE.

AMOUNT RECEIVED.

\$15.00.

CHIEF CLERK.

TOWNSEND BROS.

Registered Attorneys.

No. 370.

IN THE UNITED STATES PATENT OFFICE.

James R. Townsend, Francis M. Townsend.
321-322-323-324 Potomac Block (Opposite City
Hall) Broadway.

Edward Double,
Under Reamer.

Los Angeles, Cal., Oct. 21, 1901. 189
Commissioner of Patents.

Sir: We herewith enclose Petition and Power of Attorney, Specification, Oath, and 2 sheets of Drawings in the matter of the above-mentioned Application for Patent. Also U. S. Certificate of Deposit covering \$15.00 filing fee.

Very respectfully,

TOWNSEND BROS.

Mail Room. Oct. 26, 1901. U. S. Patent Office.

TOWNSEND BROS.

Registered Attorneys.

No. 370.

IN THE UNITED STATES PATENT OFFICE.

James R. Townsend, Francis M. Townsend.

Potomac

OFFICE, 9 ~~DOWNEY~~ BLOCK.

Los Angeles, California.

PETITION AND POWER OF ATTORNEY.

TO THE HON. COMMISSIONER OF PATENTS.

Your petitioner Edward Double, whose postoffice address is Santa Paula, California, citizen of the United States residing at Santa Paula in the county of Ventura and State of California, prays that letters patent may be granted to himself for the ~~improvement in~~ Underreamer set forth in the annexed specification, and he hereby appoints the firm of TOWNSEND BROS., the individual members of which firm are James R. Townsend, ~~Alfred I. Townsend~~ and Francis M. Townsend of Los Angeles, California, his attorneys, with full power of substitution and revocation to prosecute this application, to make alterations and amendments therein, to receive the patent and to transact all business in the PATENT OFFICE connected therewith.

EDWARD DOUBLE.

SPECIFICATION.

To All Whom it May Concern.

Be it known that I, Edward Double, a citizen of the United States, residing at Santa Paula, in the

county of Ventura and State of California, have invented a new and useful UNDERREAMER, of which the following is a specification.

An object of this invention is to provide an underreamer which is easily constructed, effective in action and will not be liable to any breakage or loss of parts while in operation.

My invention includes the novel underreamer and the combinations and parts hereinafter described and claimed, and is capable of being carried out in various ways.

The accompanying drawings illustrate my invention.

Figure I is a view partly in vertical mid-section of an underreamer in operation below a well-casing, a portion of which is shown.

Fig. II is a plan of the lower end of the underreamer with the slips in the position shown in Fig I.

Fig. III is a view of an underreamer with parts in position for passing through the casing. Portions are shown in vertical mid-section. A fragment of the casing is shown in axial section.

Fig. IV is an elevation of the underreamer intact viewed from the right of Fig. III.

Fig. V is an elevation of the underreamer mandrel viewed from the right of Fig. IV ; portions being broken away to expose the ^{inner} construction of the lower part of the mandrel.

Fig. VI is an enlarged plan of the lower end of the underreamer mandrel, inverted.

Figs. VII and VIII are sections on lines indicated by VII and VIII, respectively, in Fig. I, looking in

the directions of the arrows, respectively.

Fig. IX is an enlarged mid-sectional detail to illustrate the manner of applying or taking off the slips.

Figs. X, XI and XII illustrate one of the slips from different points of view.

a designates a hollow mandrel desirably constructed of a hollow body 1 and a joint member 2 screwed thereon; the hollow body 1 being furnished at its upper end with a screw-threaded pin 3 to screw into the socket 4 in the lower end of the joint member 2. The hollow mandrel is furnished with an inter-
with oppositely arranged parallel bearing faces
 nal shoulder 5, a downward extension 6, Λ having a key-way 7 therein, shoulders 8 at the sides of such extension, and upwardly and inwardly sloping tapering dovetail slip-ways 9 beneath said shoulders. 10 designates a spring on the shoulder 5 in the hollow mandrel. 11 designates a rod playing up and down in the mandrel and furnished with a key-seat 12 and supported by the spring 10. Preferably the rod 11 is furnished with a nut 13 screwed on its upper end to be upheld by the spring 10. 14 designates a washer between the nut and the spring. 15 desig-

per A

per B

^{tilt}
 nates ~~dovetail~~ Λ slips slidingly connected with the mandrel and playing in the slip-ways 9 and furnished with key-seats 16, respectively. 17 designates a key in the key-seats of the slips and rod and playing in the key-way 7 of said extension and upheld by the spring-supported rod 11 to hold the slips against the shoulders 8. Λ Said slips are furnished with in-
B¹
 ward projections 18 to slide upon the downward extension 6 of the mandrel to spread apart the cutting

Insert B¹

edges 19 of the slips when the slips are drawn up. The slips 15 are slidingly mounted on opposite sides of the downwardly-extending portion of the mandrel and the key-seats 16 thereof are on the inner faces of the slips respectively and are practically closed at their outer ends, thus to exclude any mud or other foreign materials when the underreamer is in operation. 20 designates small holes in the slips respectively to allow a punch 21 to be inserted for adjusting the key in the operation of applying or taking off the slips. The key is preferably a notched key, being provided in its lower edge with a notch 22, so that when the key is in place in its seat 12 the ^{walls of the} A notch will engage the rod 11, thus to guard against displacement of the key from the position shown in Figs. I and III. The spring 10 affords yielding means for constantly holding the rod 11 up in the notch 22 and to hold the slips 15 against the shoulders 8; the parts of the underreamer being constructed to allow the key to be inserted through the rod 11 into the key-seat of a slip only when the slips and rod are drawn down with the key-seat 12 of the rod flush with the bottom of the key-way 7 in the mandrel. For this purpose the tapering dove-^{plane of the} tail slip-ways 9 open laterally just above the A lower end of the bottom of the key-way 7 in the extension to allow the key 17 to be inserted in the key-seats 12 and 20 only when said seats are flush with the lower end of the key-way 7 and the slip drawn out, as far sideways as it can be drawn, as shown in Fig. IX.

To assemble the parts of the underreamer, in the

first instance, the hollow body 1 being unscrewed from the joint member 2, the spring 10 will be inserted into the chamber 23 of the mandrel to rest on the shoulder 5 therein and the slip-carrying rod 11 will be inserted into place and the washer 14 and nut 13 adjusted, as shown in Fig. I. The nut is preferably held from unscrewing by means of a cotter-pin 24 passed through the rod 11 after the nut has been screwed home. The rod is then forced or pulled downward by any suitable means into the position shown in Fig. IX, thus bringing the bottom of the key-seat 12 flush with the bottom of the slot 7 in the extension 6 of the mandrel; then one of the slips is applied in position with its key-seat 16 ready to receive the key 17 when the same is inserted through the key-seat 12 and the slot 7; then the key is inserted and is passed through the key-seat of the rod sufficiently far to allow the other slip to be brought into position so that the key may be pushed back into the key-seat of said other slip; then a suitable instrument, such as the punch 21, will be inserted through the hole 20 and the key will be pushed back into the key-seat of the slip last applied, whereupon the notch 22 will be brought into position to receive the lower wall of the key-seat 12; then the rod 11 is released, thus allowing the yielding means 10 to draw the rod up into the mandrel, thus bringing the slips 15 up against the shoulders 8 and the inward projections 18 against the sides of the downward extension 6, thereby spreading apart the lower ends of the slips.

The face 25 of the lower end of the downward ex-

tension 6 of the mandrel is upwardly sloping at its edges and the upper faces 26 of the extensions are downwardly sloping so that when the slips are drawn upward they are readily forced outward by the sliding contact of the sloping faces 25 and 26.

By the construction shown wherein the hollow mandrel is provided at its upper end with a pin screwed into the lower end of the joint member 2, great strength of the hollow mandrel is insured.

In Fig. I, *b* designates the well-casing, and *c*, the usual shoe at the bottom of such casing.

In order to conveniently remove and re-apply the slips for the purpose of sharpening, or for any other purpose, the lower end of the rod 11 is furnished with a screw-threaded socket 27, and means for drawing down the rod against the pressure of the spring 10 are temporarily screwed into the socket to enable the operator to bring the rod 11 into position to allow the slips to be removed and replaced without unscrewing the body of the mandrel from the joint member.

The eye-bolt 28 shown in Fig. IX indicates a form of such means.

To remove the slips, the rod will be drawn down into the position shown in Fig. IX, thus bringing the key against the lower end of the key-way 7 in the extension 6 and allowing the rod to be drawn out of engagement with the notched edge of the key 17, whereupon a suitable instrument, such as the punch 21, will be inserted into the hole 20, and the key driven into the position substantially shown in Fig. IX, thus releasing one of the slips, whereupon the

punch 21 will be inserted into the hole 20 in the other slip and the key will be driven out of the key-seat 16 in said other slip, thereby releasing the other slip.

To replace the slips, the operation just described will be reversed.

When the slips have been replaced, the rod will be released and the eye-bolt unscrewed and the apparatus is ready for use.

29 designates the dovetail flanges of the slips to play in the ways 9.

To introduce the under-reamer into the well-cas-
 ing, the slips will be ^{tilted and} Λ drawn down into the position
 shown in Fig. III, thus bringing the projections 18
 below the extension 6, whereupon the edges 19 are
 brought toward each other sufficiently to allow the
 tool to pass down through the casing, and when the
 slips escape below the shoe *c*, the spring 10 draws
 up the rod 11 which tilts the slips
 Λ ~~the parts~~ into cutting position, as indicated in Fig.
 I. When the tool is drawn upward, the slips coming
 into contact with the shoe, will be ^{tilted and} Λ pressed into the
 position shown in Fig. III and will readily pass out
 through the casing.

What I claim and desire to secure by letters patent
 of the United States is:—

1. An under-reamer comprising a hollow man-
 drel furnished with an internal shoulder, a down-
 ward extension Λ ^{having opposite parallel bearing faces} having a key-way therein, shoul-
 ders at the sides of such extension, and upwardly and
 inwardly sloping dovetail slip-ways beneath said
 shoulders; a spring on the shoulder in the hollow

mandrel; a rod playing in the mandrel furnished with a key-seat and supported by the spring; dove-
^{tilt}tail \wedge slips playing in the slip-ways and furnished with key-seats respectively; a key in the key-seats of the slips and rod and playing in the key-way of said extension to hold the slips against the shoulders; said slips being furnished with inward projections to slide upon the downward extension of the mandrel to spread apart to cutting edges of the slips when the slips are drawn up.

2. An under-reamer furnished with a mandrel ^{provided with opposite parallel bearing faces} having a downward extension \wedge and a key-way in the extension; a spring-supported rod furnished with a ^{tilt}key-seat and playing up and down in the mandrel; \wedge slips slidingly connected with the mandrel and furnished with inward projections to slide upon the ^{opposite bearing faces of the} \wedge downward extension to spread the slips apart at the lower ends when the slips are drawn up; and a key carried by the rod and carrying the slips.

3. In an under-reamer, the combination of a mandrel; slips slidingly mounted on opposite sides of a portion of said mandrel and furnished on their inner faces respectively with key-seats; \wedge ^{B²}a yieldingly supported rod playing lengthwise of the mandrel and furnished with a key-seat; and a notched key in the key-seats of the rod and slips. \wedge ^{A²}

4. A mandrel furnished with shoulders and a slotted extension beyond said shoulders and with dovetail ways on opposite sides of said extension;

per C

tilt

dovetail \wedge slips for said ways furnished on their inner faces respectively with key-seats; a rod sliding in said mandrel and furnished with a key-seat; a

per A

a portion of said rod taking into the notch of said key

notched key in the key-seats of the slips and rod; \wedge and yielding means to draw the rod up; the parts being constructed to allow the key to be inserted through the rod into the key-seat of a slip only when the slip and rod are drawn down with the key-seats thereof flush with the bottom of the key-way in the mandrel.

per A

tilt

5. In an under-reamer, dovetail \wedge slips furnished with key-seats respectively on their inner faces; a rod furnished with a key-seat; a key for said key-seats; a mandrel in which the rod plays constructed with a slotted extension and tapering dovetail slip-ways which open laterally just above the lower end of the bottom of the slot in the extension, to allow the key to be inserted in the slot and key-seats only when the key-seats are flush with the lower end of the slot.

per A

tilt slips

~~6. An under-reamer furnished with a hollow mandrel \wedge ; a slip-carrying rod in said mandrel; means to yieldingly draw the rod into the mandrel; and a detachable member screwed into the end of the rod to draw the rod out for the purpose of applying and taking off the slips.~~

Cancelled
per B

per A

tilt

6 7. In an under-reamer, a mandrel furnished with a hollow slotted extension, the lower end of which slopes upward at the edges; \wedge slips slidingly con-

nected with the mandrel and furnished on their inner faces with projections, the upper faces of which slope downward to slide upon the extension of the mandrel; and means connecting the slips with the rod.

8. The under-reamer slip furnished on its inner face with a key-seat, and also furnished with a hole to insert a punch to adjust a key.

9. An under-reamer mandrel comprising a joint member having a screw threaded socket at its lower end and a mandrel-body having a screw-threaded pin at its upper end, and shoulders and an extension A at its lower end; and ways on the opposite side of said extension.

10. The dovetailed under-reamer slip furnished on its inner face with a projection 18, and also with a key-seat 16 and with a hole 20 opening thereinto.

IN TESTIMONY WHEREOF I have signed my name to this specification, in the presence of two subscribing witnesses, at Santa Paula, in the County of Ventura and State of California, this 19th day of October, 1901.

Inventor:

EDWARD DOUBLE.

Witnesses:

WALTER WEEKLEY.

W. F. DINGER.

OATH.

STATE OF CALIFORNIA,

VENTURA

COUNTY OF ~~LOS ANGELES~~,—ss.

Edward Double, the above-named petitioner, being duly sworn (or affirmed) deposes and says that he verily believes himself to be the original, first and sole inventor or discoverer of the ~~improvement in~~ Under Reamer described and claimed in the annexed specification; that he does not know and does not believe that the same was ever known or used before his invention or discovery thereof; or patented or described in any printed publication in any country before his invention or discovery thereof or more than two years prior to this application; or in public use or on sale in the United States for more than two years prior to this application, and that no application for patent on said improvement has been filed by him ^{legal representatives or assigns} or his ~~representatives~~ in any foreign country.

And said Edward Double states that he is a citizen of the United States and resident of Santa Paula in the County of Ventura and State of California.

EDWARD DOUBLE.

Sworn to and subscribed before me this 19th day of October, 1901,

[Seal]

ROBT. M. CLARKE,

Notary Public in and for the County of Ventura
~~Los Angeles~~, State of California.

Serial No. 80,144 Paper No. 1/2

MAIL ROOM

APPLICATION

OCT. 26, 1901

Filed Oct. 26, 1901.

U. S. PATENT OFFICE

E. Double.

TOWNSEND BROS.

Registered Attorneys.

MAILED

OCT. 28, 1901

No. 370.

Townsend Bros.

IN THE UNITED STATES PATENT OFFICE

James R. Townsend,

Francis M. Townsend

Edward Double,

Under Reamer, 80,144

Application sworn Oct. 19, 1901.

Filed

S No.

Los Angeles, Cal.,

Oct. 23, 1901. 190

Dated

No.

Commissioner of Patents,

Sir: In sheet 1 of the drawings, please change the numbering of the Figure immediately under Fig. I to be Fig. II, instead of Fig. III, as it erroneously appears on the drawings.

Very respectfully,

TOWNSEND BROS.,

Attorneys for Double.

JRT.—W.

Serial No. 80,144, Paper No. 1 Letter to Office.

Filed Nov. 2, 1901. E. Double. Mail Room.

Nov. 2, 1901. U. S. Patent Office.

A. B. S.

Paper No. —

All communications respecting this application should give the serial number, date of filing, and title of invention.

Div. —, Room No. 243.

Address only

“The Commissioner of Patents,
Washington, D. C.”

DEPARTMENT OF THE INTERIOR.

UNITED STATES PATENT OFFICE.

WASHINGTON, D. C., Dec. 14, 1901.

MAILED “ “ “

Edward Double,

Care Townsend Bros.,

Potomac Block, Los Angeles, Cal.

Please find below a communication from the Examiner in charge of your application.

#80,144, filed Oct. 26, 1901, for Under-Reamer.

F. I. ALLEN,

Commissioner of Patents.

Claims 1, 2, 3, 4, and 5 are rejected as involving the mere double use of the slips and slip adjusting devices of either of the following patents, namely: 479,933, Carruthers, Aug. 2, 1892; 492,371, Mack, Feb. 21, 1893, and 563,054, Palm, June 30, 1896—Artesian & Oil, Wells; Tube Clamps.

Claims 6 and 7 are rejected in view of 679,384, Kellerman, July 30, 1901—Artesian & Oil, Wells; Reamers.

The 8th claim represents a mere fragment of an

operative device. It is rejected, however, in view of 492,371, Mack, cited above; also in view of 647,605, Mentry, Apr. 17, 1900—Artesian & Oil Wells; Reamers.

Claim 9 is rejected on Mentry, above cited; also in view of 439,275, Hobart et al., Oct. 28, 1890—same sub-class.

The 10th claim is also for an unpatentable fragment, and is rejected on the references cited for the 8th claim.

LEWIS B. WYNNE,

Examiner,

A. McN.

Division XXV.

Serial No. 80,144, Paper No. 2 Exrs. Letter Rejection. Dated Dec. 14, 1901. Double, E.

Room 243

80,144, Paper No. 2

Div. 25.

Amdt. A.

TOWNSEND BROS.

Registered Attorneys.

430-431-432-433 BRADBURY BLOCK, 304-306 S.

Broadway.

No. 370.

IN THE UNITED STATES PATENT OFFICE.

MAILED

SEP. 16, 1902.

Townsend Bros.

PATENT OFFICE

SEP. 23, 1902

DIVISION XXV.

James R. Townsend,

Francis M. Townsend.

Edward Double.

Under-Reamer.

Los Angeles, Cal., Sept. 13, 1902. 190

Filed Oct. 26, 1901. S No. 80,144.

DatedNo.

Hon. Commissioner of Patents,

Sir: Examiner's letter of Dec. 14, 1901, has been considered.

We amend the specifications as follows: Page 2,
line 8, after the numeral "6" insert— with oppositely
arranged parallel bearing faces—. Page 5, line 9
from the bottom, after "be" insert— tilted and —.
Same page, line 5 from the bottom, cancel "the parts"
and substitute — up the rod 11 which tilts the
slips —. Same page, line 2 from the bottom, after
"be" insert — tilted and —. Same page after the
last paragraph, insert: —

A¹

— The rounded end 25 of the extension 6 when pressed against the abrupt projections 18 causes a quick tilting of the slips to throw their cutting edges outwardly and the slips are thus brought into position with a comparatively slight longitudinal movement. —

Claim 1, line 2, after "extension" insert — having
opposite parallel bearing faces —.

Claim 2, line 2, after "extension" insert — pro-
vided with opposite parallel bearing faces, —. Same

claim, line 5, after "the" insert — opposite bearing
faces of the —.

Claim 3, after the last word "slips" change the
period to a comma and add — a portion of said rod
taking into the notch of said key. —.

Claim 4, line 6, after "rod;" insert — a portion
into
of said rod taking Δ the notch of said key,—.

Claim 5, line 1, after "dovetail" insert — tilt —.

Claim 6, line 1, after "mandrel;" insert — tilt
slips; —.

Claim 7, line 3, after "edges;" insert — tilt —.

Claim 9, line 4, after "extension" insert — with
opposite parallel bearing faces —.

Cancel claims 8 and 10 and substitute:

~~—8. In an under-reamer the combination of a
hollow mandrel, a slip-carrying rod in said man-
drel, slips connected to said rod, and means for tilting
said slips.~~

10. 8. In an under-reamer the combination of a
hollow mandrel with a hollow slotted extension, said
extension having opposite parallel bearing faces, a
slip carrying rod in said mandrel, slips connected to
said rod, said slips having projections which bear
against said extension, said slips being provided with
key-seats, a key carried by said rod, each end of the

key lying in a key-seat of a slip, and the key-seat in each slip being somewhat larger than the key to allow the slips to partake of a tilting action. —

None of the references cited seem to show slips which partake of a tilting action. The slips in applicant's invention have a tilting action and by reason thereof they are quickly brought into position with a very slight longitudinal movement and with little lost motion of any of the parts. Neither do any of the references show a downward extension provided with opposite parallel bearing faces nor do they show slips provided with projections on their inner faces to co-operate with a downward extension provided with parallel bearing faces.

The claims have been amended to bring out these features and it is thought that the case is now in condition for allowance and such action is respectfully requested.

Very respectfully,
TOWNSEND BROS.,
Attys. for Double.

JRT.A.

M.

G. T. HACKLEY.

Mail Room. Sep. 22, 1902. U. S. Patent Office.
U. S. Patent Office, Sep. 23, 1902. Division 38.

L. C.

Paper No. 4.

All communications respecting this application should give the serial number, date of filing, and title of invention.

Div. —, Room 222.

Address only

“The Commissioner of Patents,
Washington, D. C.”

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

WASHINGTON, D. C., October 24, 1902.

MAILED “ “ “

Edward Double,
Care Townsend Brothers,
Potomac Block,
Los Angeles, California.

Please find below a communication from the EXAMINER in charge of your application for “Under-Reamer,” filed October 26, 1901, Serial No. 80,144.

F. I. ALLEN.

Commissioner of Patents.

In response to the communication filed September 22, 1902:

The phrase “tilt slips” used in claims 5, 6, and 7, is not explained in the specification. It should be specifically stated what element is referred to.

The last three lines of claim 10 should be more fully stated in the specification.

Claims 1 and 2 are rejected on patent to Swan,

683,352, September 24, 1901, (Artesian & Oil Wells, Reamers.)

Claims 3 and 4 are rejected on patent to Swan, cited, in view of patent to Meissner, 555,254, February 25, 1896, (Stone Working, Drills,) showing a key with a recess in it.

Claim 6 is rejected on patent to Palm, of record. It is common to screw handles on to articles to lift them as in lifting patterns out of molds. The addition of a handle is not invention in view of the construction shown in patent to Palm.

Claim 8 is rejected on patent to Brown, 687,296, November 26, 1901, (Artesian & Oil Wells, Reamers.)

Claim 9 appears incomplete as there is nothing to cooperate with parts specified. The elements appear in patents to Mentry and Brown, cited, and the claim is rejected.

Claims 5, 7, and 11, are as at present advised allowable, when the objections to them, noted above, are removed.

M. E. P.

G. R. IDE,
Actg. Exr.

80,144, Paper No. 5.

Amdt. B.

MAILED

NOV. 28, 1902.

Townsend Bros.

ROOM 222

DIV. 38.

Paper #5

TOWNSEND BROS.

Registered Attorneys.

No. 370.

IN THE UNITED STATES PATENT OFFICE.

430-431-432-433 Bradbury Block,

304-306 S. Broadway.

James R. Townsend,

Francis M. Townsend

Edward Double

Under-Reamer.

Filed Oct. 26, 1901 S. No. 80,144.

Dated..... No.....

Los Angeles, Cal. Nov. 28, 1902. 190

Commissioner of Patents,

Sir: Replying to the Office letter of Oct. 24, 1902,
we amend as follows:

Page 2, line 17, for "dovetail" substitute—tilt—.

Line 23, after "shoulders 8" insert.

The sockets or key-seats 16 are somewhat larger than the key 17 to permit the slips 15 to partake of a tilting action, the key 17 thus forming a portion, on the rod 11, on which the tilt slips or bits 15 are

250 *Wilson & Willard Manufacturing Company*

loosely swung or pivoted, adapting their lower ends to tilt or swing in toward the center of the stock or mandrel portion to pass through the well-casing or to tilt away from the center to assume the proper position for reaming. The tilt-slips are provided with shoulders 18, adapted to slide upon a spreading portion provided in connection with the mandrel-body.

Claim 1, line 7, after "dovetail" insert—tilt—.

Claim 2, line 4 before "slips" insert—tilt—.

Claim 3, line 4, after "key-seats" insert—

said key-seats being somewhat larger than the key on the operating rod,—.

Cancel claim 6.

Renumber claim 7 as 6.

Substitute the following for claim 8, renumbering as claim 7.

—7. In an under-reamer, the combination with a hollow mandrel, provided with a slotted extension, a spring-actuated slip operating rod provided with a pivot key, tilt slips provided with key-seats adapted to be engaged by said pivot key, said key-seats being somewhat larger than the key to allow the slips to tilt, said slips provided with inwardly projecting shoulders, and said slotted extension provided with surfaces adapted to tilt said slips and hold the same in expanded position.—

Cancel claim 9.

Renumber claim 10 as 8.

—NOTE—

The specification has been amended to bring out clearly the meaning of the term “tilt” slips and to fully describe the action and results thereby secured.

Claims 1, 2 and 3 as amended clearly differentiate from Swan and as now submitted are allowable.

Claim 4 should be allowed. The patent to Swan does not show an equivalent for applicant's notched key and the patent to Meissner contains no suggestion of any use of such a notched key in an under-reamer or other device so that the key can be inserted through the rod into the key-seat of a slip only when the slip and rod are drawn down with the key-seats flush with the bottom of the mandrel. This construction effectuates a novel and advantageous construction and is not shown or suggested in either Swan or Meissner. The claim is submitted with full confidence of its allowance.

Claim 7 as rewritten is drawn for a combination of elements not found in any of the references cited nor in the prior art and is clearly allowable.

Claims 6 and 9 have been cancelled, the former as containing a combination not essential, the latter as being incomplete and for an inoperative combination.

The case ^{is} A now believed in condition for immediate allowance.

Early action is requested.

252 *Wilson & Willard Manufacturing Company*

Please change the address of applicant's Attorneys to be

430-3 Bradbury Block,
Los Angeles, Cal.

Very respectfully,

TOWNSEND BROS.,

Attys. for Double.

JRT.

FREDERICK S. LYON.

M.

Mail Room. Dec. 4, 1902. U. S. Patent Office.
U. S. Patent Office, Dec. 4, 1902. Division 38.

80,144. Paper No. 6.

Amdt. C.

TOWNSEND BROS,

Registered Attorneys.

No. 370.

IN THE UNITED STATES PATENT OFFICE.

430-431-432-433 Bradbury Block,
304-306 S. Broadway.

MAILED

TO PATENT OFFICE

DEC. 2, 1902.

Townsend Bros.

James R. Townsend,

Francis M. Townsend

ROOM 222.

DIV. 38.

Edward Double.

Under-Reamer.

Los Angeles, Cal. Dec. 2, 1902, 190

Filed Oct. 26, 1901, S. No. 80,144.

Dated No.

Commissioner of Patents,

Sir: Upon further consideration of this case,
after our amendment dated Nov. 28, 1902, we amend

as follows:

Claim 4, line 3, after "dovetail" insert—tilt—.

—NOTE—

It is requested that this application be considered
in connection with this amendment of claim 4 at the
same time that action is had upon the case as
amended by our letter of Nov. 28, 1902.

Very respectfully,

TOWNSEND BROS,

Attorneys for Double.

JRT.

FREDERICK S. LYON.

M.

Mail Room. Dec. 8, 1902. U. S. Patent Office.

U. S. Patent Office, Dec. 8, 1902. Division 38.

Serial No. 80,144.

Issue Division.

All communications should be addressed to

“The Commissioner of Patents,
Washington, D. C.”

DEPARTMENT OF THE INTERIOR,
U. S. PATENT OFFICE.

Washington, D. C., January 5, 1903.

Edward Double,

c/o Townsend Bros.

Potomac Block,

Los Angeles, Cal.

Sir:—Your APPLICATION for a patent for an
IMPROVEMENT IN

Under Reamers

Filed Oct. 26, 1901, has been examined and AL-
LOWED.

The final fee, Twenty Dollars, must be paid, and the Letters Patent bear date as of a day not later than SIX MONTHS from the time of this present notice of allowance.

If the final fee is not paid within that period the patent will be withheld, and your only relief will be by a renewal of the application, with additional fees, under the provisions of Section 4897, Revised Statutes. The Office aims to deliver patents upon the day of their date, and on which their term begins to run; but to do this properly applicants will be expected to pay their final fees at least TWENTY DAYS prior to the conclusion of the six months allowed them by law. The printing, photolitho-

graphing, and engrossing of the several patent parts, preparatory to final signing and sealing, will consume the intervening time, and such work will not be done until after payment of the necessary fees.

When you send the final fee you will also send, **DISTINCTLY AND PLAINLY WRITTEN**, the name of the **INVENTOR** and **TITLE OF INVENTION AS ABOVE GIVEN**, **DATE OF ALLOWANCE** (which is the date of this circular), **DATE OF FILING**, and, if assigned, the **NAMES OF THE ASSIGNEES**.


If you desire to have the patent issue to **ASSIGNEES**, an assignment containing a **REQUEST** to that effect, together with the **FEE** for recording the same, must be filed in this Office on or before the date of payment of final fee.

After issue of the patent uncertified copies of the drawings and specifications may be purchased at the price of 5 cents each. The money should accompany the order. Postage stamps will not be received.

Respectfully,


F. I. ALLEN,


Commissioner of Patents.

 After allowance, and prior to payment of the final fee, applicants should carefully scrutinize the description to see that their statements and language are correct, as mistakes not incurred through the fault of the office, and not affording legal grounds for reissues, will not be corrected after the

delivery of the letters patent to the patentee or his agent.

[Marginal Notes:]

 In remitting the final fee give the Serial Number at the head of this notice.

 If payment is made by check or draft, the credit allowed is subject to the collection of the same.

CERTIFICATE OF DEPOSIT.

\$20 RECEIVED

JUL. 8, 1903. J.

CHIEF CLERK, U. S. PATENT OFFICE.

MAILED

JUL. 3, 1903.

Townsend Bros.

TOWNSEND BROS.

Registered Attorneys.

No. 370.

IN THE UNITED STATES PATENT OFFICE.

321-322-323-324 Potomac Block, (Opposite City
Hall) Broadway.

James R. Townsend, Francis M. Townsend

Edward Double,

Under Reamer

Filed Oct. 26, 1901. S. No. 80,144.

Allowed Jan. 5, 1903. No.

Los Angeles, Cal., Jul. 3, 1903. 189.

Commissioner of Patents,

Sir: We herewith hand you U. S. Certificate of
Deposit for \$20.00 final Government fee in the mat-

ter of the above-mentioned application. Please issue the patent as per record.

Very respectfully,

TOWNSEND BROS.

Serial No. 80,144.

Issue and Gazette Division.

All communications should be addressed to

"The Commissioner of Patents,

Washington, D. C."

DEPARTMENT OF THE INTERIOR,

UNITED STATES PATENT OFFICE.

Washington, D. C.,

July 8, 1903,

Edward Double,

c/o Townsend Bros.

Los Angeles, Cal.

SIR:

Your application for a patent for an IMPROVE-
MENT IN

Under-reamers

filed Oct. 26, 1901, has been examined and again
ALLOWED.

The final fee, TWENTY DOLLARS, in the
above-entitled case was received July 8, 1903.

Very respectfully,

F. I. ALLEN,

Commissioner of Patents.

No. 734,833.

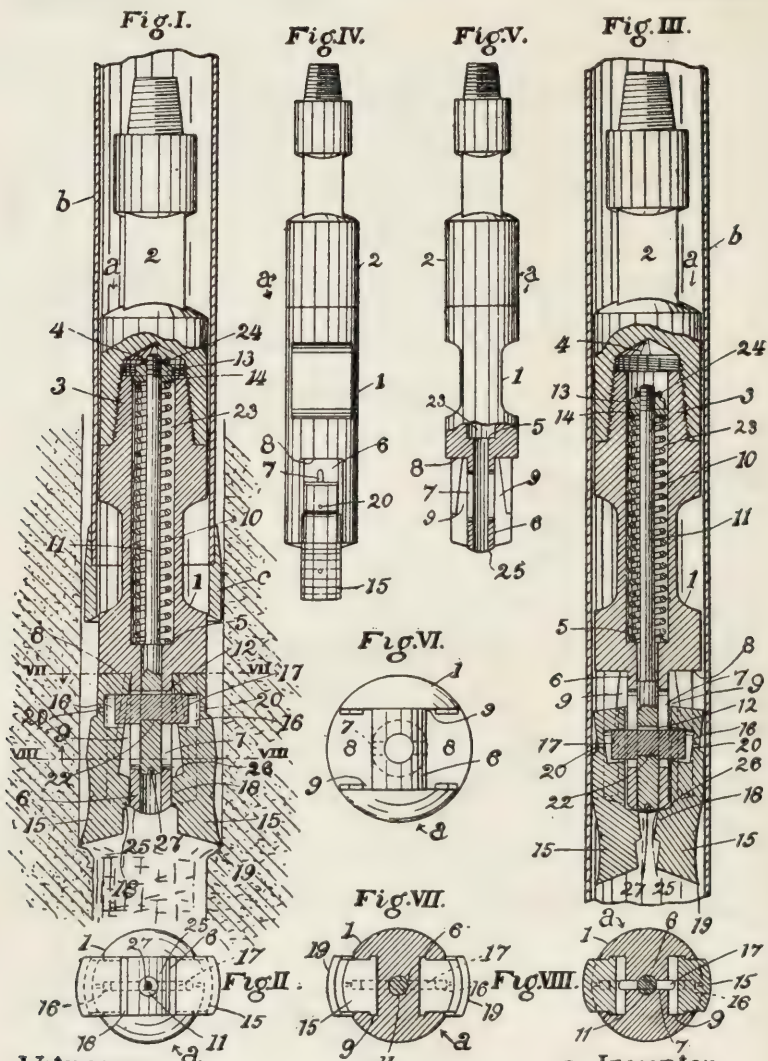
PATENTED JULY 28, 1903.

E. DOUBLE.
UNDERREAMER.

APPLICATION FILED OCT. 26, 1901.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses.
C. F. Riehy.
J. Townsend.

Inventor.
Edward Double
Townsend Bros.
his attys.

No. 734,833.

PATENTED JULY 28, 1903.

E. DOUBLE.
UNDERREAMER.

APPLICATION FILED OCT. 26, 1901.

NO MODEL

3 SHEETS—SHEET 1

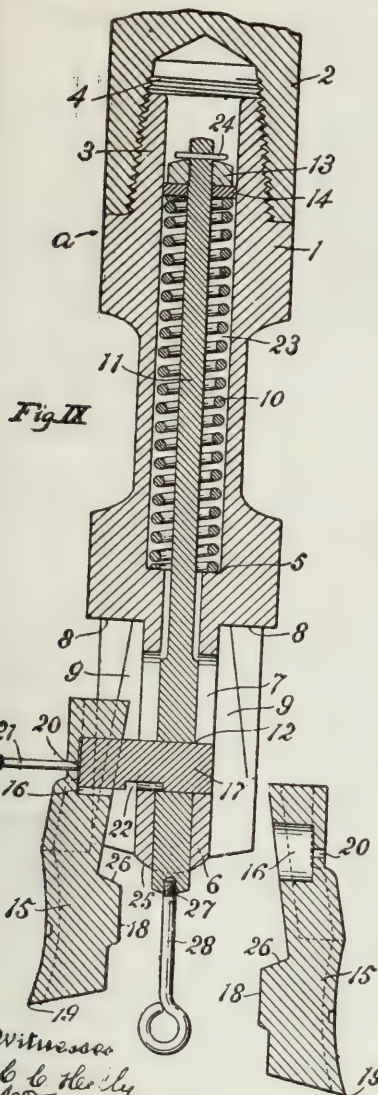


Fig. I

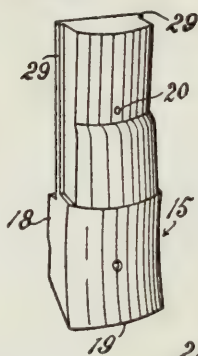


Fig. II

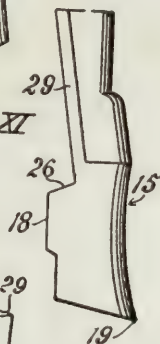
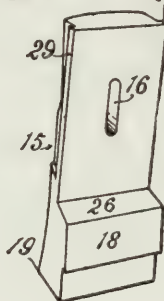


Fig. III



Witnesses
to the
J. Townsend.

Inventor
Edward Double
by Townsend Bros
his attys.

UNITED STATES PATENT OFFICE.

EDWARD DOUBLE, OF SANTA PAULA, CALIFORNIA.

UNDERREAMER.**SPECIFICATION** forming part of Letters Patent No. 734,833, dated July 28, 1903.

Application filed October 26, 1901. Serial No. 80,144. (No model.)

To all whom it may concern:

Be it known that I, EDWARD DOUBLE, a citizen of the United States, residing at Santa Paula, in the county of Ventura and State of California, have invented a new and useful Underreamer, of which the following is a specification.

An object of this invention is to provide an underreamer which is easily constructed, effective in action, and will not be liable to any breakage or loss of parts while in operation.

My invention includes the novel underreamer and the combinations and parts hereinafter described and claimed and is capable of being carried out in various ways.

The accompanying drawings illustrate my invention.

Figure I is a view partly in vertical mid-section of an underreamer in operation below a well-casing, a portion of which is shown. Fig. II is a plan of the lower end of the underreamer with the slips in the position shown in Fig. I. Fig. III is a view of an underreamer with parts in position for passing through the casing. Portions are shown in vertical mid-section. A fragment of the casing is shown in axial section. Fig. IV is an elevation of the underreamer intact viewed from the right of Fig. III. Fig. V is an elevation of the underreamer-mandrel viewed from the right of Fig. IV, portions being broken away to expose the inner construction of the lower part of the mandrel. Fig. VI is an enlarged plan of the lower end of the underreamer-mandrel inverted. Figs. VII and VIII are sections on lines indicated by VII and VIII, respectively, in Fig. I, looking in the directions of the arrows, respectively. Fig. IX is an enlarged mid-sectional detail to illustrate the manner of applying or taking off the slips. Figs. X, XI, and XII illustrate one of the slips from different points of view.

a designates a hollow mandrel desirably constructed of a hollow body 1 and a joint member 2 screwed thereon, the hollow body 1 being furnished at its upper end with a screw-threaded pin 3 to screw into the socket 4 in the lower end of the joint member 2. The hollow mandrel is furnished with an internal shoulder 5, a downward extension 6, with oppositely-arranged parallel bearing-faces having a keyway 7 therein, shoulders 8 at the

sides of such extension, and upwardly an inwardly sloping tapering dovetail slipway 9 beneath said shoulders.

10 designates a spring on the shoulder 5 of the hollow mandrel.

11 designates a rod playing up an dovetail in the mandrel and furnished with a key-seat 12 and supported by the spring 10. Preferably the rod 11 is furnished with a nut 13 screwed on its upper end, to be upheld by the spring 10.

14 designates a washer between the nut 13 and the spring.

15 designates tilt-slips slidingly connected with the mandrel and playing in the slip-way 9 and furnished with key-seats 16, respectively.

17 designates a key in the key-seats of the slips and rod and playing in the keyway 7 of said extension and upheld by the spring-supported rod 11 to hold the slips against the shoulders 8.

The sockets or key-seats 16 are somewhat larger than the key 17 to permit the slips to partake of a tilting action, the key 17 then forming a portion on the rod 11, on which the tilt slips or bits 15 are loosely swung pivoted, adapting their lower ends to tilt swing in toward the center of the stock mandrel portion to pass through the well casing or to tilt away from the center to assume the proper position for reaming. The tilt-slips are provided with shoulders adapted to slide upon a spreading portion provided in connection with the mandrel body. Said slips are furnished with inward projections 18 to slide upon the downward extension 6 of the mandrel to spread apart the cutting edges 19 of the slips when the slips are drawn up. The slips 15 are slidingly mounted on opposite sides of the downwardly-extending portion of the mandrel, and the key-seats 16 thereof are on the inner faces of the slips, respectively, and are practically closed at their outer ends, thus to exclude any mud or other foreign materials when the underreamer is in operation.

20 designates small holes in the slips, respectively, to allow a punch 21 to be inserted for adjusting the key in the operation of playing or taking off the slips. The key is preferably a notched key, being provided

734,833

ts lower edge with a notch 22, so that when the key is in place in its seat 12 the walls of the notch will engage the rod 11, thus to guard against displacement of the key from the position shown in Figs. I and III. The spring 10 affords yielding means for constantly holding the rod 11 up in the notch 22 and to hold the slips 15 against the shoulders, the parts of the underreamer being constructed to allow the key to be inserted through the rod 11 into the key-seat of a slip only when the slips and rod are drawn down with the key-seat 12 of the rod flush with the bottom of the keyway 7 in the mandrel. For this purpose the tapering dovetail slipways 9 open laterally just above the plane of the lower end of the bottom of the keyway 7 in the extension to allow the key 17 to be inserted in the key-seats 12 and 20 only when the seats are flush with the lower end of the keyway 7 and the slip drawn out as far sideways as it can be drawn, as shown in Fig. IX. To assemble the parts of the underreamer the first instance, the hollow body 1 being unscrewed from the joint member 2, the spring 10 will be inserted into the chamber 23 of the mandrel to rest on the shoulder 5 therein, and a slip-carrying rod 11 will be inserted into the hole 16 and the washer 14 and nut 13 adjusted, as shown in Fig. I. The nut is preferably held from unscrewing by means of a cotter-pin 24 passed through the rod 11 after the nut has been screwed home. The rod is then moved or pulled downward by any suitable means into the position shown in Fig. IX, thus bringing the bottom of the key-seat 12 flush with the bottom of the slot 7 in the extension 6 of the mandrel. Then one of the slips is applied in position, with its key-seat 16 ready to receive the key 17, when the key is inserted through the key-seat 12 and the slot 7. Then the key is inserted and is pressed through the key-seat of the rod sufficiently far to allow the other slip to be brought into position, so that the key may be pushed back into the key-seat of said other slip. Then a suitable instrument, such as the punch 21, will be inserted through the hole 20 and the key will be pushed back into the key seat of the slip last applied, whereupon the notch 22 will be brought into position to receive the lower wall of the key-seat 12. Then the rod 11 is released, thus allowing the yielding means to draw the rod up into the mandrel, thus bringing the slips 15 up against the shoulders and the inward projections 18 against the faces of the downward extension 6, thereby separating apart the lower ends of the slips. The face 25 of the lower end of the downward extension 6 of the mandrel is upwardly sloping at its edges and the upper faces 26 of the extensions are downwardly sloping, so that when the slips are drawn upward they are readily forced outward by the sliding contact of the sloping faces 25 and 26. By the construction shown wherein the hollow mandrel is provided at its upper end with

a pin screwed into the lower end of the joint member 2 great strength of the hollow mandrel is insured.

In Fig. I, *b* designates the well-casing and *c* the usual shoe at the bottom of such casing.

In order to conveniently remove and reapply the slips for the purpose of sharpening or for any other purpose, the lower end of the rod 11 is furnished with a screw-threaded socket 27, and means for drawing down the rod against the pressure of the spring 10 are temporarily screwed into the socket to enable the operator to bring the rod 11 into position to allow the slips to be removed and replaced without unscrewing the body of the mandrel from the joint member.

The eyebolt 28 (shown in Fig. IX) indicates a form of such means.

To remove the slips, the rod will be drawn down into the position shown in Fig. IX, thus bringing the key against the lower end of the keyway 7 in the extension 6 and allowing the rod to be drawn out of engagement with the notched edge of the key 17, whereupon a suitable instrument, such as the punch 21, will be inserted into the hole 20 and the key driven into the position substantially shown in Fig. IX, thus releasing one of the slips, whereupon the punch 21 will be inserted into the hole 20 in the other slip and the key will be driven out of the key-seat 16 in said other slip, thereby releasing the other slip.

To replace the slips, the operation just described will be reversed.

When the slips have been replaced, the rod will be released and the eyebolt unscrewed and the apparatus is ready for use.

29 designates the dovetail flanges of the slips to play in the ways 9.

To introduce the underreamer into the well-casing, the slips will be tilted and drawn down into the position shown in Fig. III, thus bringing the projections 18 below the extension 6, whereupon the edges 19 are brought toward each other sufficiently to allow the tool to pass down through the casing, and when the slips escape below the shoe *c* the spring 10 draws up the rod 11, which tilts the slips into cutting position, as indicated in Fig. I. When the tool is drawn upward, the slips coming into contact with the shoe will be tilted and pressed into the position shown in Fig. III and will readily pass out through the casing.

The rounded end 25 of the extension 6 when pressed against the abrupt projections 18 causes a quick tilting of the slips to throw their cutting edges outwardly, and the slips are thus brought into position with a comparatively slight longitudinal movement.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. An underreamer comprising a hollow mandrel furnished with an internal shoulder, a downward extension having opposite parallel bearing-faces having a keyway therein, shoulders at the sides of such extension, and upwardly and inwardly sloping dovetail slip-

ways beneath said shoulders; a spring on the shoulder in the hollow mandrel; a rod playing in the mandrel furnished with a key-seat and supported by the spring; dovetail tilt-slips playing in the slipways and furnished with key-seats respectively; a key in the key-seats of the slips and rod and playing in the keyway of said extension to hold the slips against the shoulders; said slips being furnished with inward projections to slide upon the downward extension of the mandrel to spread apart the cutting edges of the slips when the slips are drawn up.

2. An underreamer furnished with a mandrel having a downward extension provided with opposite parallel bearing-faces and a keyway in the extension; a spring-supported rod furnished with a key-seat and playing up and down in the mandrel; tilt-slips slidingly connected with the mandrel and furnished with inward projections to slide upon the opposite bearing-faces of the downward extension to spread the slips apart at the lower ends when the slips are drawn up; and a key carried by the rod and carrying the slips.

3. In an underreamer, the combination of a mandrel; slips slidingly mounted on opposite sides of a portion of said mandrel and furnished on their inner faces respectively with key-seats, said key-seats being somewhat larger than the key on the operating-rod; a yieldingly-supported rod playing lengthwise of the mandrel and furnished with a key-seat; and a notched key in the key-seats of the rod and slips, a portion of said rod taking into the notch of said key.

4. A mandrel furnished with shoulders and a slotted extension beyond said shoulders and with dovetail ways on opposite sides of said extension; dovetail tilt-slips for said ways furnished on their inner faces respectively with key-seats; a rod sliding in said mandrel and furnished with a key-seat; a notched key in the key-seats of the slips and rod; a portion of said rod taking into the notch of said key, and yielding means to draw the rod up; the parts being constructed to allow the key to be inserted through the rod into the key-seat of a slip only when the slip and rod are drawn down with the key-seats thereof flush with the bottom of the keyway in the mandrel.

5. In an underreamer, dovetail tilt-slip furnished with key-seats respectively on their inner faces; a rod furnished with a key-seat a key for said key-seats; a mandrel in which the rod plays constructed with a slotted extension and tapering dovetail slipways which open laterally just above the lower end of the bottom of the slot in the extension, to allow the key to be inserted in the slot and key-seat only when the key-seats are flush with the lower end of the slot.

6. In an underreamer, a mandrel furnished with a hollow slotted extension, the lower end of which slopes upward at the edges; tilt-slips slidingly connected with the mandrel and furnished on their inner faces with projections the upper faces of which slope downward to slide upon the extension of the mandrel; and means connecting the slips with the rod.

7. In an underreamer, the combination with a hollow mandrel, provided with a slotted extension, a spring-actuated slip-operating rod provided with a pivot-key, tilt-slip provided with key-seats adapted to be engaged by said pivot-key, said key-seats being somewhat larger than the key to allow the slips to tilt, said slips provided with inwardly-projecting shoulders, and said slotted extension provided with surfaces adapted to tilt said slips and hold the same in expanded position.

8. In an underreamer the combination of a hollow mandrel with a hollow slotted extension, said extension having opposite parallel bearing-faces, a slip-carrying rod in said mandrel, slips connected to said rod, said slip having projections which bear against said extension, said slips being provided with key-seats, a key carried by said rod, each end of the key lying in a key-seat of a slip, and the key-seat in each slip being somewhat larger than the key to allow the slips to partake of tilting action.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, at Santa Paula, the county of Ventura and State of California, this 19th day of October, 1901.

EDWARD DOUBLE.

Witnesses:

WALTER WEEKLEY,
W. F. DINGER.

166. Artesian & Oil Wells.

6. Reamers.

1901

CONTENTS:

Print

Application papers. O. K.

1. Letter to Office Nov. 2, 1901.
2. Rej. Dec. 14, 1901.
3. Amdt. A. Sep. 22, '02.
4. Rej. Oct. 24, 1902.
5. Amdt. B. Dec. 4, '02.
6. Amdt. C. Dec. 8, '02.
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.
- 19.
- 20.
- 21.
- 22.
23. A. O. W. Reamers.

TITLE:

Improvement in Under Reamers.

[Endorsed]: U. S. Dist. Ct., So. Dist. Cal., So. Div. In Equity—#1540. Union Tool Co. et al. vs. Wilson & Willard Mfg. Co. Defendant's Exhibit File Wrapper and Contents Double Patent in Suit. Leo Longley, Special Examiner.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit Certified File Wrapper and Contents Double Patent in Suit. Filed May 8, 1917. F. D. Monckton, Clerk.

Defendant's Exhibit U. S. Plotts Patent No. 668,340.

[Endorsed]: U. S. Dist. Court, So. Dist. of Cal., So. Div. #1540—In Equity. Union Tool Company et al. vs. Wilson & Willard Mfg. Co. "Defendant's Exhibit U. S. Plotts Patent No. 668,340." Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit U. S. Plotts Patent No. 668,340. Filed May 8, 1917. F. D. Monekton, Clerk.

No. 668,340.

Patented Feb. 19, 1901

W. PLOTTS.

BEAMER FOR OIL OR LIKE WELLS.

(Application filed May 6, 1907.)

(No Model.)

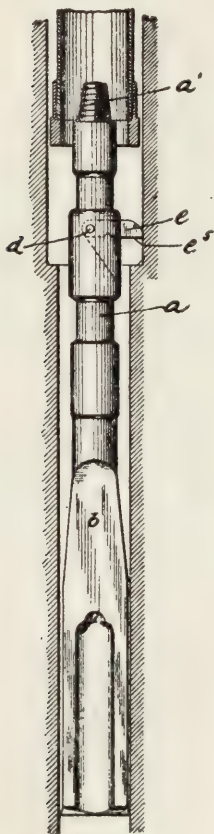


Fig. 1

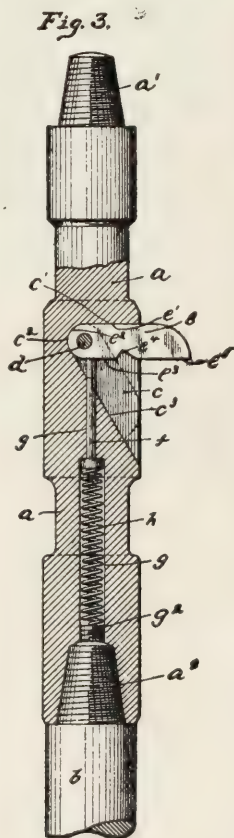


Fig. 3.

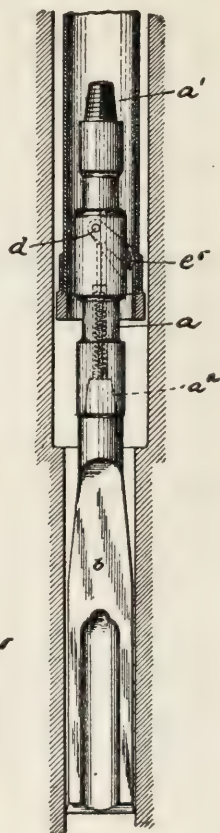


Fig. 2.

Witnesses

Walter Tamm
Robert C. Zottner

Inventor:

William Plotts
By *Kemp* *Attorneys*

UNITED STATES PATENT OFFICE.

WILLIAM PLOTTS, OF McDONALD, PENNSYLVANIA.

REAMER FOR OIL OR LIKE WELLS.

SPECIFICATION forming part of Letters Patent No. 668,340, dated February 19, 1901.

Application filed May 6, 1897. Serial No. 635,351. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM PLOTTS, a resident of McDonald, in the county of Washington and State of Pennsylvania, have invented a new and useful Improvement in Reamers for Oil and Like Wells; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to reamers for oil and like wells.

The invention has reference more particularly to that class of reamers generally known as "under" reamers, in which a cutter is employed which normally projects out beyond the body of the cutter, but which when passing through the casing is withdrawn, so as not to interfere with the passage of the reamer through the same. The difficulty heretofore in the use of this class of under reamers has been the liability of the breaking or bending of the pin on which the cutter is mounted when said cutter is subjected to the severe strains which they have to bear in the cutting of the rock. If the pin breaks and the cutter is detached and becomes lodged in the well, it may prevent the further drilling of the well.

The object of my invention is to provide a reamer with the cutting-knife so secured and protected against strains as to obviate the difficulty hereinbefore referred to.

To this end my invention comprises, generally stated, a reamer having formed in the body portion thereof a seat or recess, a cutter mounted on a pin in said seat, the inner end of said cutter abutting against the solid body of the reamer at the inner face of said seat and the outer end extending normally beyond said body, (in a horizontal position,) and spring mechanism for retaining said cutter in this position.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a view of my improved reamer in use in a well. Fig. 2 is a view showing the same passing through the casing. Fig. 3 is an enlarged longitudinal section of the reamer removed from the well.

Like letters of reference indicate like parts in each view.

The letter *a* represents the body of the reamer, having the ordinary threaded connection *a'* at its upper end and the threaded seat *a²* at its lower end, with which the bit *b* engages.

A seat or recess *c* is formed in the body *a* at a suitable point therein. This seat *c* is preferably formed, as illustrated, with the straight upper face *c'*, the curved rear face *c²*, and the inclined face *c³*.

Mounted on the pin *d* is the cutter *e*, said cutter having the straight upper edge *e'*, the curved rear edge *e²*, the lower edge *e³*, with the recess *e⁴* formed therein, and the outer cutting edge *e⁵*. When the cutter *e* is mounted on the pin *d* and held in its normal position, the upper edge *e'* will be in contact with the upper face *c'* of the seat *c*, the curved rear edge *e²* will abut against the curved rear face *c²*, while the cutting edge *e⁵* will extend beyond the body of the reamer.

In order to retain the cutter *e* in its normal position for cutting, a rod *f*, movable vertically in a seat *g* formed for it in the body *a*, has its upper end forced into contact with the lower edge *e³* of the cutter *e* by means of the spring *h*. This spring *h* fits in an enlarged portion *g'* of the seat *g* and presses against a head *f'* on said rod *f*, said spring being interposed between said head *f'* and the bottom of the seat *g'*, which consists of the plug *g²*. By the above construction the seat *g* is only of sufficient diameter to permit of the rod *f* moving freely therein, so that I do not weaken the body of the reamer so much as where the spring encircles the rod and necessitates a seat of the same size as the enlarged portion *g'* for its entire length.

The operation of my improved reamer is as follows: When the reamer is being lowered through the casing, the cutter *e* will have its outer or cutting edge *e⁵* moving in contact with the casing, and accordingly the cutter *e* will assume the position shown in Fig. 2. In this case the pressure brought to bear upon the cutter to lower same will also lower the rod *f* until the lower edge *e³* of said cutter comes in contact with the inclined face *c³* of the seat *c*, whereupon the upper end of the rod *f* will enter the recess *e⁴* in the cutter *e*. In this manner the reamer is lowered until it gets beyond the casing, as shown in Fig. 1,

whereupon the spring *h* forces up the rod *f* and the cutter *e* resumes its normal position within the seat *c*. The cutter then has its cutting edge *e*⁵, extending beyond the body of the reamer, in position to cut the rock below the lower end of the casing to permit of said casing being lowered. The reamer is raised and lowered in the ordinary manner of drilling, said reamer being also turned at each stroke. The cutter thus cuts under the casing in the manner illustrated.

The cutter may be used in connection with the drill-bit, as shown, or it may be used independently, if desired.

By having the cutter supported in the manner described, with its rear edge *e*² backed up by the solid body of the reamer, any tendency toward inward movement on the part of the cutter is resisted, so that there is practically no strain on the pin *d*. This prevents the bending or breaking of the pin *d* and the consequent displacement of the cutter or its complete detachment from the reamer. I have found by experience that the severest strains brought upon the cutter are those lateral or horizontal strains which come from the walls of the well. Consequently by my construction the cutter is braced and backed up in such a manner as to withstand these strains without injury.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a reamer for oil and like wells, the combination with a solid body portion having a recess formed therein and a pin projecting through the rear portion of the recess, said recess adjacent to the pin being concentric

therewith, of a cutter pivotally mounted on said pin and having a rear end that conforms to and closely fits the portion of the recess that is concentric with the pin, and a spring for holding said cutter normally up in a horizontal position, substantially as set forth.

2. In a reamer for oil and like wells, the combination with a solid body portion having a recess formed therein and a pin projecting through said recess, adjacent to the rear end thereof, the upper side of said recess being substantially perpendicular to the axis of the reamer-body and the rear portion being concentric with the pin, of a cutter having a rear end that closely fits the rear end of the recess, and a top edge that fits the upper side of the recess when in working position, and a spring for holding said cutter normally in a horizontal position, substantially as set forth.

3. In a reamer for oil and like wells, the combination with a solid body portion having a recess therein and a pin projecting through said recess adjacent to the rear end thereof, said rear end being concentric with the pin, of a cutter pivotally mounted on said pin and having a rear end that conforms to and closely fits the rear end of the recess, a vertically movable rod below said cutter, and a spring adapted to force said rod into engagement with said cutter, substantially as set forth.

In testimony whereof I, the said WILLIAM PLOTTS, have hereunto set my hand.

WILLIAM PLOTTS.

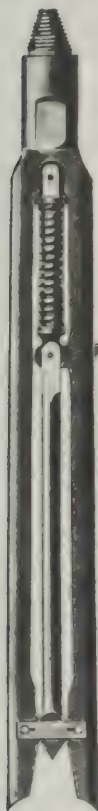
Witnesses:

ROBT. D. TOTTEN,
ROBERT C. TOTTEN.

UNDER REAMING AND DRILLING TOOLS.

MACK'S PATENT UNDER REAMER.

FIG. 1705.



Latch.

To enlarge the hole under the drive pipe or casing to the size of the shoe or couplings, so that the drive pipe or casing can be readily forced down.

FILED

APR 16 1913

WM. M. VAN DYKE, Clerk
By Chas. H. Williams
Deputy Clerk

To enter the pipe, force the spring up until the tongue is relieved, when the reamers can be drawn together and remain so until the tool is below the pipe, when the spring will force the tongue between the reamers. When raising, the latch will strike against the end of the pipe and the spring will be forced up again.

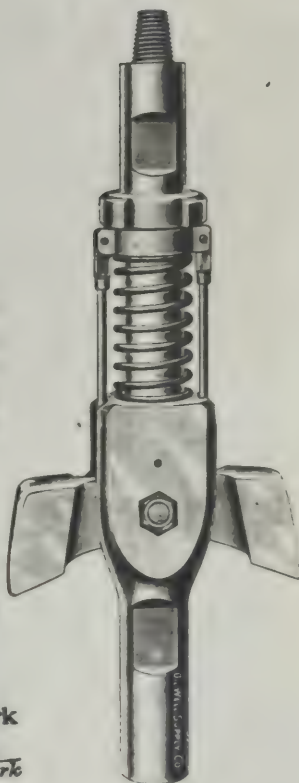
2996

U. S. Circuit Court of Appeals
for the Ninth Circuit

Page 80, Oil Well
Supply Co's Catalog of 1900.
MAY - 8 1914

RUSSIAN UNDER REAMER.

FIG. 1707.



To enter the pipe, force the reamers down, where they will remain until the tool is below the pipe, when they will spring out and remain so. When raising the tool, the reamers will be forced down by striking the end of the pipe.

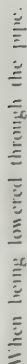
A bit for drilling is attached to the bottom.

270

2.

FIG. 1715.

FIG. 1713.



2996

FILED

APR 16 1913

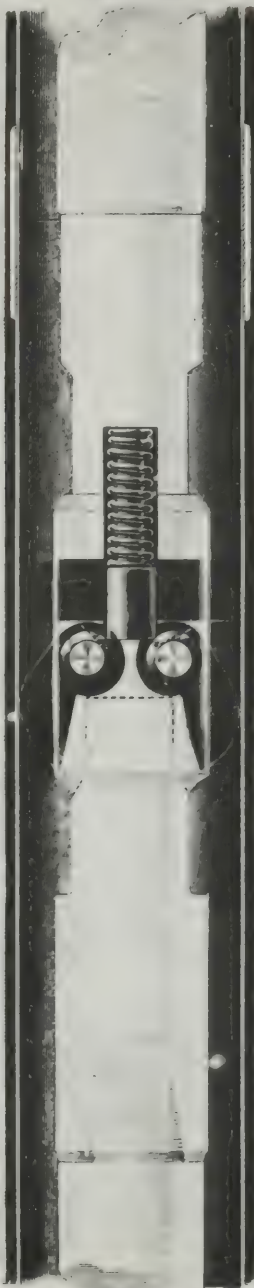
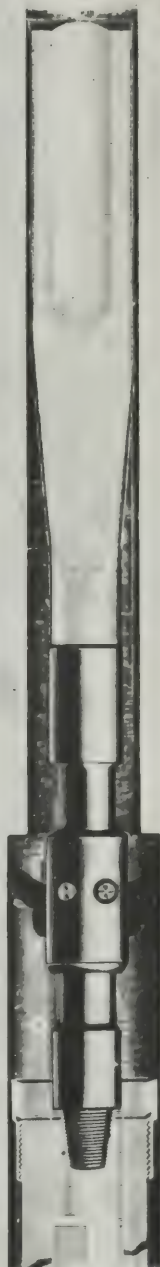


FIG. 1717.



Drive pipe.

where

Enlarged hole.

Bit drilling small hole ahead of reamer.

For drilling and reaming of cased sections. The bit is screwed to the end of the reamer and makes a hole the size of the drive pipe or casing, the reamer enlarging the hole sufficiently to allow the drive pipe or casing to sink freely. The drive pipe or casing is supported by jacks, allowing enough space below shoe for the reamer to work without striking the bottom of the hole. *Double Flare* complete. Fig. 1715 is reamer passing through drive pipe or casing. Fig. 1717 is reamer and bit working in well. These are all phantom views.

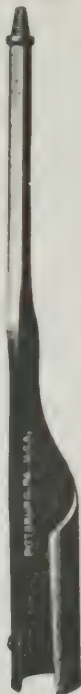


ARTS OF THE CANADIAN POLE TOOL SYSTEM OF DRILLING WELLS.

ONE LEG SOCKET.
G. 2153.



HALF TURN SOCKET.
FIG. 2156.



TWO LEG SOCKET.
FIG. 2159.



UNDER REAMER.
FIG. 2161.



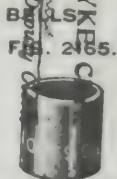
See longley, special Examiner

FILED

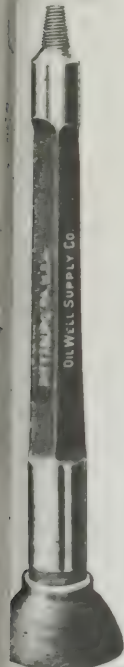
APR 16 1913

M. VAN DYKE

By M. Van Dyke



BELL MOUTH DUTCHMAN.
FIG. 2163.



Has two dogs with springs.

BELL MOUTH DUTCHMAN
FIG. 2164.



For 5 3/4-inch casing.

2996

For 4 1/2-inch casing.

U. S. Circuit Court of Appeals
For the Ninth Circuit

Fig 2164
Page 117 of 117
Supply Co's Catalog of 1900.
MAY - 8 1917

F. D. MONTGOMERY, Clerk

Defendant's Exhibit Letter J. O. Dart to Edward North of March 15, 1902.

Coalinga, Calif., March 15, 1902.

Mr. Edw'd North,

Los Angeles, Calif.

Dear Sir:—

Regarding my use of your Under-reamer, I would say that I used it in this field to my perfect satisfaction. It is, by long odds the best under-reamer I have ever seen. I reamed about 125 ft with it, including three very hard shells (the last one being of a flinty character and about 4 ft thick) and had no difficulty in getting the casing down afterward, not being obliged to run the reamer a second time on any of the work. I ran this reamer (55/8") on a 31½"x32' stem in the third hole without damage, and did the work in much less time than I could have done it with any other reamer I have ever run.

Yours truly,

J. O. DART.

[Endorsed]: U. S. Dist. Court, So. Dist. Cal., So. Div. No. 1540. Union Tool Co. et al. vs. Wilson & Willard Mfg. Co. "Defendant's Exhibit Letter, J. O. Dart to Edward North, of March 15, 1902." Leo. Longley, Special Examiner. Filed April 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit Letter, J. O. Dart to Edward North, of March 15, 1902. Filed May 8, 1917. F. D. Monckton, Clerk.

**Defendant's Exhibit Letter of March 19, 1902,
Martin Barber to Edward North.**

SANTA FE.

The A. T. & S. F. Ry. Co. Sou. Cal. Ry. Co.
G. C. & S. F. Ry. Co. The S. F. & S. J. V. Ry.
Santa Fe Pac. R. R. Co. The S. K. Ry. Co. of Tex.
Santa Fe Oil Wells, Mar. 19th, 1902.

Mr. Ed. North,
Los Angeles.

Friend Edward:

Yours of the 15th ins't at hand and in reply would say that your 7" underreamer in so far as we have used it, is a "Joe Dandy" and I don't know what more to say about it.

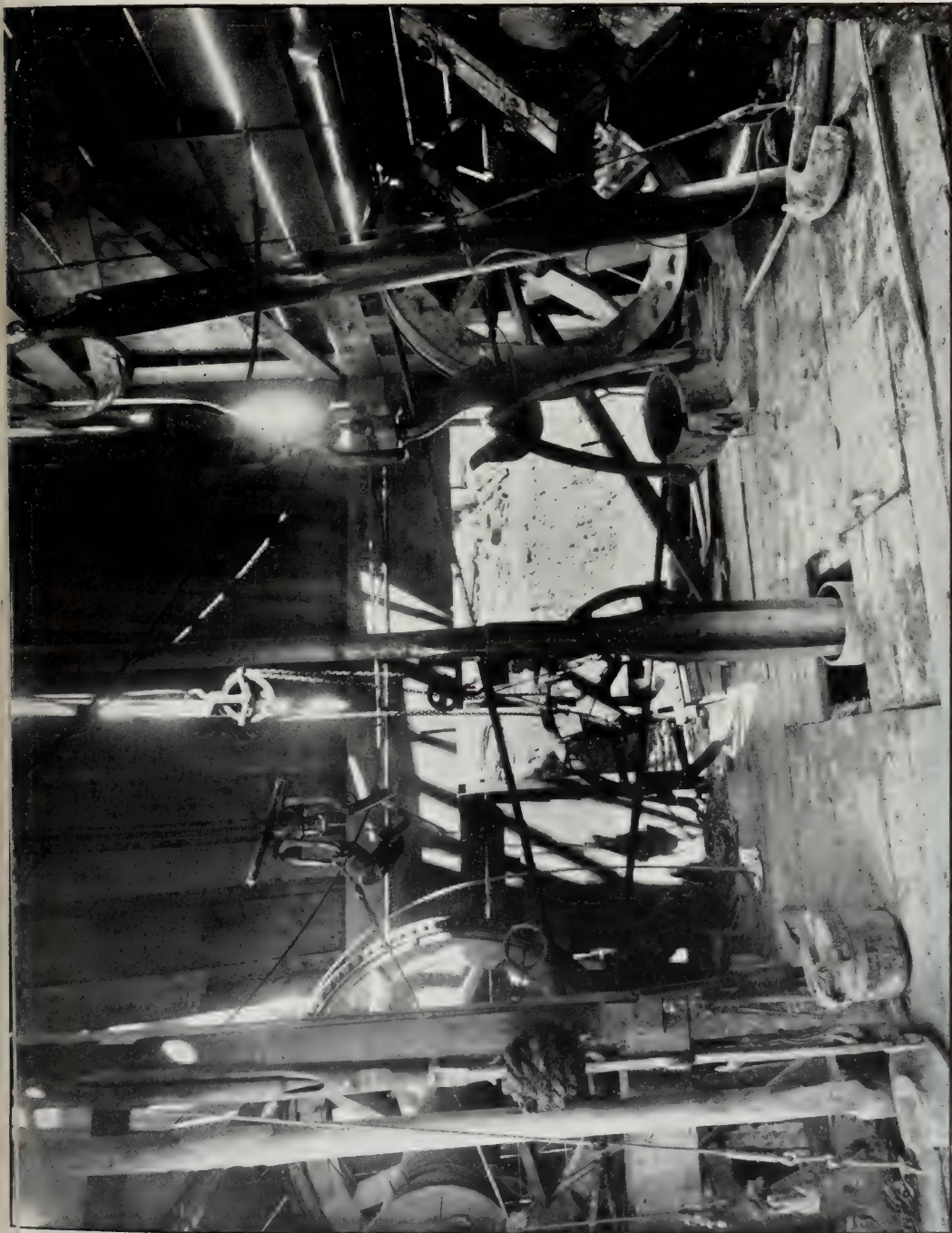
Yours truly,

MARTIN BARBER,
Foreman, Santa Fe Oil Wells, Fullerton, Calif.

[Endorsed]: U. S. Dist. Court, So. Dist. Cal., So. Div. No. 1540. Union Tool Co. et al. vs. Wilson & Willard Mfg. Co. "Defendant's Exhibit Letter of March 19, 1902, Martin Barber to Edward North." Leo. Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit Letter of March 19, 1902, Martin Barber to Edward North. Filed May 8, 1917. F. D. Monekton, Clerk.

Defendant's Exhibit Photograph of California Oil Well Rig Showing Calf-wheel, Bull-wheel, Wire Rope and Top of Casing in Hole, the Casing Shown Being Heavy Casing Weighing not Less Than 54 Pounds to the Foot.



[Endorsed]: U. S. Dist. Ct., So. Dist. Cal., So. Div. No. 1540—Equity. Union Tool Co. et al. vs. Wilson & Willard Mfg. Co. Defendant's Exhibit Photograph of California Oil Well Rig Showing Calf-wheel, Bull-wheel, Wire Rope and Top of Casing in Hole, the Casing Shown Being Heavy Casing Weighing Not Less Than 54 Pounds to the Foot. Leo. Longley, Spl. Exr. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit Photograph of California Oil Well Rig Showing Calf-wheel, Bull-wheel, Wire Rope and Top of Casing in Hole, the Casing Shown Being Heavy Casing Weighing Not Less Than 54 Pounds to the Foot. Filed May 8, 1917. F. D. Monckton, Clerk.

Defendant's Exhibit Wilson Underreamer Patent.

[Endorsed]: U. S. Dist. Court, So. Dist. of Cal., Southern Division. No. 1540. Union Tool Co. et al. vs. Wilson & Willard Mfg. Co. "Defendant's Exhibit Wilson Underreamer Patent." Leo Longley, Special Examiner. Filed Apr. 16, 1913. Wm. M. Van Dyke, Clerk. By Chas. N. Williams, Deputy Clerk.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Deft's. Exhibit Wilson Underreamer Patent. Filed May 8, 1917. F. D. Monckton, Clerk.

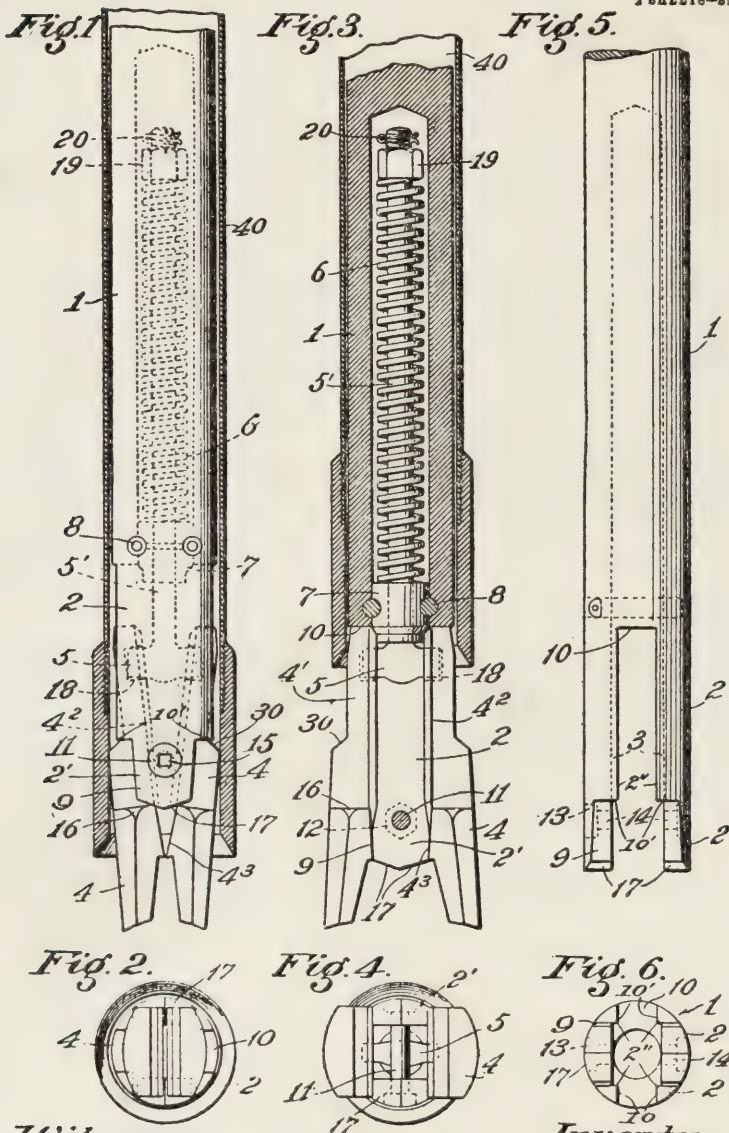
No. 827,595.

PATENTED JULY 31, 1906.

E. C. WILSON.
UNDERREAMER.

APPLICATION FILED NOV. 28, 1905.

2 SHEETS—SHEET 1.



Witnesses:

E. C. Hollis
C. J. Williams

Inventor,

Elihu C. Wilson
James R. Townsend
his atty

No. 827,595.

PATENTED JULY 31, 1906.

E. C. WILSON.
UNDERREAMER.

APPLICATION FILED NOV. 28, 1905.

2 SHEETS—SHEET 1.

Fig. 7.

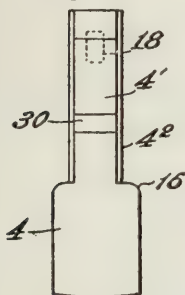


Fig. 8.

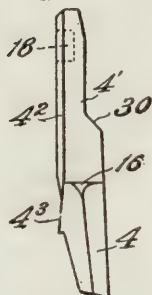


Fig. 9.

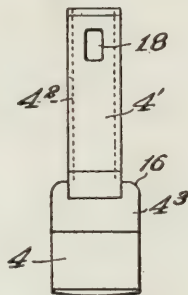


Fig. 10.



Fig. 11.

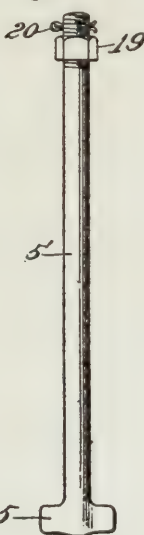


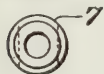
Fig. 12.



Fig. 13.



Fig. 14.



Witnesses:

C. C. Holly
C. J. Williams

Inventor,

Elihu C. Wilson.

By James P. Townsend
his Atty

UNITED STATES PATENT OFFICE.

ELIHU C. WILSON, OF BAKERSFIELD, CALIFORNIA.

UNDERREAMER.

No. 827,595.

Specification of Letters Patent.

Patented July 31, 1906.

Application filed November 28, 1905. Serial No. 289,380.

To all whom it may concern:

Be it known that I, ELIHU C. WILSON, a citizen of the United States, residing at Bakersfield, in the county of Kern and State of California, have invented a new and useful Underreamer, of which the follow is a specification.

Objects of this invention are to provide an underreamer of superior strength and of superior width and expansion of cutters so as to enable reaming as great a portion of the circumference of the hole as possible at each stroke, to insure greater safety against losing the cutters from the body while reaming, to avoid the necessity of a middle joint in the mandrel or reamer body, and to leave a maximum open space between the cutters to receive the loose material or sludge at the bottom of the well or other opening during the operation of drilling.

By this invention it is possible to increase the strength of the cross or T which suspends the cutters.

In this invention a cross or T formed of a single forging is provided for suspending the cutters.

Another decided advantage is simplicity and convenience of attaching and removing the cutters and suspending devices from the reamer-body.

Another advantage is facility of collapsing the cutters. I so construct the mouth of the underreamer as to dispense with stock between the collapsed cutters, thus enabling the cutters to close together. This feature makes extreme expansion possible and makes the use of maximum amount of stock in shanks of cutters possible, thus insuring maximum strength of cutters.

The accompanying drawings illustrate the invention.

Figure 1 is a view of the underreamer in a casing just before it has passed through the shoe of the casing, the parts being collapsed. Fig. 2 is a view looking at the bottom of Fig. 1. Fig. 3 is a view of this newly-invented underreamer in a well, the same having just passed through the casing-shoe and expanded for reaming the hole below. Portions are shown in mid-section. Fig. 4 is a view looking at the bottom of Fig. 3. Fig. 5 is a view of the reamer-body at right angles to Figs. 1 and 2. Fig. 6 is a view looking at the bottom of Fig. 5. Fig. 7 is a front view of a cutter detached. Fig. 8 is an edge view of a cutter at right angles to Fig. 7. Fig. 9 is a

view of the inside or back of the cutter. Fig. 10 is a view looking down on the top of the cutter. Fig. 11 is a view of the cross. Fig. 12 is a view of the cross at right angles to Fig. 11. Fig. 13 is a side view of the spring seat-block detached. Fig. 14 is a bottom view of the same.

1 designates a hollow body of an underreamer terminating in prongs 2, forming a fork, said prongs having shoulders 2" on their inner faces to form ways 3 for cutters. Said prongs are provided with and terminate in downwardly-projecting lugs 2' to spread the cutters apart.

4 designates the cutters, which are interchangeable; 4', the cutter-shank; 4², bearing-shoulders of the cutters to engage inside the ways 3; 4³, expansion bearing-faces of the cutters on the sides of said cutters.

The inner faces of the prongs 2 are parallel, and the sides or shoulders 2", which form the ways 3, are also parallel. The cutter-shank 4' and its bearing-shoulders 4² are straight—that is to say, the sides or edges thereof are parallel and fit the ways 3.

5 is a cross 5' the stem of the cross, and 6 the spring which actuates the cross. The parts 5 5' constitute spring-actuated means for actuating the cutters to expand the same.

7 is a block forming a seat for the spring 6. One or more dowel-pins 8 may be provided as means for holding the block or spring-seat 7 in place.

9 designates the spreading bearings for holding the cutters 4 apart, and 10 the down thrust bearings for the cutters. The down thrust bearings 10' are in the nature of shoulders formed by the edges of the forks at the base of the lugs 2'. The prongs 2 of the body are of substantially one thickness throughout, excepting that they are reduced at their lower ends to form lugs for spreading the cutters 4 apart. The edges of the lugs 2' for the spreading bearings 9 and the prongs terminate abruptly in the shoulders 10' at the base of the lugs 2". This construction affords the necessary operative structure with maximum strength for minimum weight of body.

11 is a detachable cross-piece in the form of a bolt secured by a nut 12. 13 is an angular socket in the outer face of one of the fork around the bolt-hole 14 in said fork. The nut 12 is conformed to the angular socket and the bolt 11 is provided with an angular socket 15 in its head to receive a wrench (not shown) for screwing the bolt into the nut.

827,595

The expansion bearing-faces 4³ terminate at their upper ends in rounded corners or bearings 16 to ride more readily over the beveled end faces 17 of the downwardly-projecting lugs 2' to engage said bearings for expanding the cutters.

18 designates recesses in the inner faces of the cutters for engaging the ends of the cross 5.

19 and 20 indicate the usual tension-nut for the spring 6 and the cotter-pin for securing the same.

To assemble the underreamer, the block 7 will first be placed on the stem 5' of the cross 5, and the spring 6 is then adjusted and secured in place by the nut 19 and cotter-pin 20. Then the cutters are placed on the ends, respectively, of the cross 5, which seat in the recesses 18 therefor. Then the parts thus assembled are inserted into the hollow mandrel and brought into the position shown in Fig. 3, whereupon the dowel-pins 8 are inserted and the cross-piece formed of the bolt 11 is then inserted. The nut 12 is placed in its angular socket 13, and the bolt or cross-piece 11 is then screwed home. The underreamer is then in condition for operation.

To use the underreamer, the cutters will be drawn down below the downwardly-projecting lugs 2', thus collapsing the same into the position shown in Fig. 1, whereupon the underreamer will be inserted into the pipe or casing in the usual manner and allowed to descend. When it has passed through the pipe, as shown in Fig. 3, the spring operates in the usual manner to draw the cross 5 up, thus bringing the cutters into the expanded position shown in Fig. 3. The rounded shoulders 16 ride readily over the beveled faces 17, and the upper ends of the cutters seat against the downthrust bearings 9, and the bearing-shoulders 4² of the cutters engage the ways 3 of the fork prongs or members 2, thereby being solidly held during the operation of underreaming. The spreading bearings 9 of the lugs 2' engage the expansion bearing-faces 4³ of the cutters at the same time, so that the tool is practically a unit during the operation of underreaming.

30 designates the usual shoulders on the cutters for drawing the same in when the tool is removed through the pipe or casing 40. It is advisable that the lower ends of the forks 2 should not form downthrust bearings for the cutters, as there would otherwise be a tendency of crystallization of said forks, which is avoided by making the downthrust bearings at 10 only.

The cross-piece 11 serves as a brace for the prongs of the fork and prevents accidental removal of the cutters and T or cross 5.

It is to be noted that by the construction shown the cutters are quickly expanded at the initial upward movement of the same

after escaping the shoe of the casing 40, and that immediately thereafter the cutters are solidly held in the straight and parallel ways 3, and that when the cutters are fully drawn up they seat on the downthrust bearings 10 and the spreading bearings 9, while the shanks are rigidly held throughout their length. Said spreading bearings are on the lugs 2', which constitute wedges for wedging the cutters apart, and said bearings are at the sides of the lower ends of the body, thus engaging the outer edges of the cutters to hold the cutters apart and leaving an open space between the middle portions of the cutters for a greater distance upward from the lower ends of the cutters than would be the case were the cutters held apart by any intermediate portion between the lugs.

I term the cutters "shouldered cutters," for the reason that the rounded corners 16, which extend away from the shank at right angles thereto, are in the nature of shoulders, the inner faces 4³ of which engage the spreading faces 9 of the side lugs 2' to brace the cutters and hold them apart.

What I claim is—

1. An underreamer-body terminating in prongs having projecting lugs at their lower ends with spreading bearings 9 for holding the cutters apart.

2. An underreamer-body terminating in prongs and provided with upper and lower bearings for the cutters, said prongs having projecting lugs, the edges of which form lower bearings for holding the cutters apart, and the ends of said lugs having beveled end faces.

3. An underreamer-body terminating in prongs the inner faces of which are provided with straight parallel ways, the ends of said prongs terminating in lugs below said ways to spread and hold the cutters apart.

4. An underreamer-body terminating in prongs forming a fork, said prongs having shoulders on their inner faces to form ways for the cutters.

5. A hollow underreamer-body terminating in prongs forming a fork having shoulders on the inner faces to form ways for the cutters, cutters in said ways, a cross in said hollow body for operating said cutters, a spring for operating the cross, a block in the body to form a seat for said springs, and one or more dowel-pins securing the block in place.

6. A hollow underreamer-body, cutters, a cross inside the hollow body for operating said cutters, a spring for operating said cross, a block in said body forming a seat for said spring, and one or more dowel-pins for holding the block in place, said block and pins being located entirely above the head of the cross.

7. A hollow underreamer-body terminating in prongs forming a fork and provided with ways and downthrust bearings for cut-

- ters, cutters in said ways engaging said bearings, a cross for operating said cutters, a spring for actuating said cross, a block forming a guide for the stem of the cross and a seat for the cross-actuating spring, its lower end terminating above the head of the cross and projecting below the downthrust bearings to hold the upper ends of the cutters apart, and means for holding the block in the reamer-body.
8. A hollow underreamer-body terminating in prongs forming a fork, said prongs having shoulders on their inner faces to form ways, cutters in said ways, means for operating the cutters, and a detachable cross-piece connecting the ends of the fork.
9. An underreamer-body terminating in prongs forming a fork and provided with shoulders on the inner faces of the prongs which form cutter-ways and terminate in downward-projecting lugs, and, cutters mounted between the prongs of said fork and having shoulders inside the fork and faces to bear on the projecting lugs.
10. An underreamer-body terminating in prongs having projecting lugs at their lower ends to hold the cutters apart.
11. An underreamer-body terminating in prongs forming a fork having beveled faces at the ends of its prongs, cutters having shoulders to ride over said beveled faces, and means for suspending said cutters in said body.
12. An underreamer-body terminating in prongs forming a fork, the ends of said prongs being provided with lugs to spread the cutters apart.
13. An underreamer-body terminating in prongs forming a fork, said prongs having shoulders on the inner faces to form ways for the cutters, and said prongs terminating in lugs to act as spreaders for the cutters.
14. A hollow underreamer-body terminating in prongs forming a fork, said prongs terminating in lugs for spreading the cutters, said lugs having beveled ends to engage bearings on cutters to expand cutters.
15. An underreamer-body terminating in prongs forming a fork, said prongs terminating in lugs or projections, said lugs having beveled faces or bearings to expand the cutters, and also faces or bearings for the cutters to rest on after they have expanded to a normal position for reaming.
16. An underreamer-cutter having two shoulders and a bearing-face on the inner side of each of the two shoulders of the cutter.
17. An underreamer-cutter having a shank and a shoulder on either side of the shank of the cutter, each of said shoulders projecting at right angles to the shank of the cutter and having a bearing-face on its inner side.
18. An underreamer having a body terminating in a fork, and cutters suspended between the prongs of the fork, the ends of said prongs constituting wedges to wedge between the cutters.
19. An underreamer comprising a body terminating in two prongs, and cutters each having two shoulders and a bearing-face on the inner side of each of the two shoulders to engage said prongs.
20. An underreamer comprising a body terminating in prongs the inner faces of which are provided with straight parallel ways, and cutters having straight shanks fitting said ways, the ends of said prongs terminating in lugs below said ways to spread and hold the cutters apart.
- In testimony whereof I have hereunto set my hand at Bakersfield, California, this 20th day of November, 1905.
- ELIHU C. WILSON.
- In presence of—
H. I. TUPMAN,
T. E. KLOPSTEIN.

**Defendant's Exhibit Specifications of U. S. Brown's
687,296.**

[Endorsed]: C. C. 1540. Union Tool Co vs. Willard & Wilson Mfg. Co. "Defts. Ex. Specifications of U. S. Brown Patent 687,296." Filed Feb. 24, 1916. Wm. M. Van Dyke, Clerk. Floyd S. Fisk, Deputy.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit Specifications of U. S. Brown's 687,296. Filed May 8, 1917. F. D. Monekton, Clerk.

No. 667,298.

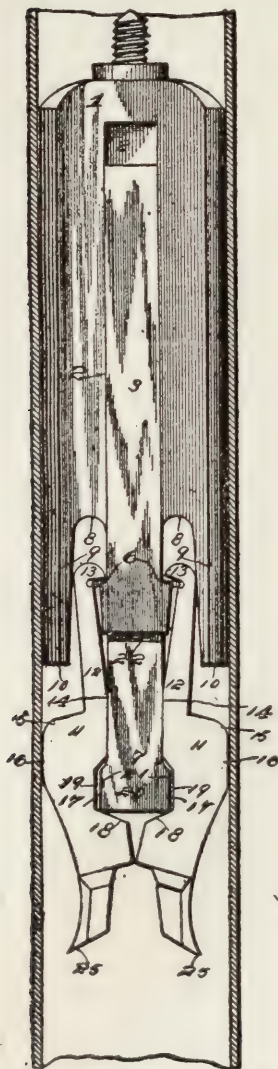
Patented Nov. 26, 1901.

J. S. BROWN.

REAMING TOOL.

(Application filed Apr. 20, 1901.)

(No Model.)



Witnesses

Fig. 1.

Wm. D. Thompson
Chas. S. Hoyer



Fig. 3.

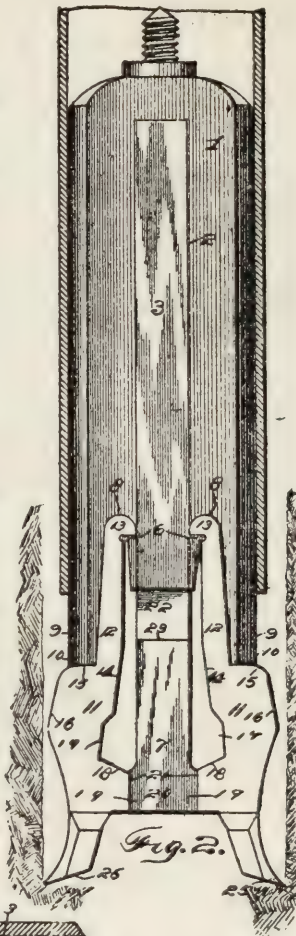


Fig. 2.

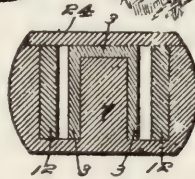


Fig. 4.

J. S. Brown, Inventor.
by C. A. Snow & Co.
Attorneys

UNITED STATES PATENT OFFICE.

JACOB S. BROWN, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-HALF TO FRIEDRICH EICHENHOFER, OF LOS ANGELES, CALIFORNIA.

REAMING-TOOL.

SPECIFICATION forming part of Letters Patent No. 687,296, dated November 26, 1901.

Application filed April 25, 1901. Serial No. 57,427. (No model.)

To all whom it may concern:

Be it known that I, JACOB S. BROWN, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Reaming-Tool, of which the following is a specification.

This invention relates to a reaming-tool for use with a string of well-drilling tools in forming oil or other wells; and the object of the same is to provide an automatically-operating attachment that will contract to pass through a casing-section and when liberated from the lower ends of the latter expand to drill or cut a hole ahead of the said lower end of the casing large enough to let the casing follow.

The invention consists in the construction and arrangement of the several parts, which will be more fully hereinafter described and claimed.

In the drawings, Figure 1 is a transverse vertical section through a portion of a well-casing, showing the improved device in elevation passing therethrough in contracted condition. Fig. 2 is a similar view showing the improved device as having reached the end of the casing and far enough projected therefrom to permit the reaming members to expand. Fig. 3 is a transverse section on the line 2 2, Fig. 2. Fig. 4 is a cross-section on the line 4 4, Fig. 2.

Similar numerals of reference are employed to indicate corresponding parts in the several views.

The numeral 1 designates a stock of suitable dimensions, having an upper reduced screw-threaded attaching end and a longitudinal spring-chamber 2, which is closed by a slide 3, having an angular end 4 extending into said chamber to receive the impact of the upper extremity of a spring 5, located in said chamber, said spring having its lower extremity bearing against the lower end wall 4 of the chamber. The lower end of the slide is formed with lateral catch projections 6, and said slide has longitudinal movement over a central depending partition-bar 7, forming an integral portion of the stock. The lower portion of the stock is formed with recesses 8 on opposite sides of the bar 7 to pro-

vide depending vertical extensions 9 with shoulders 10 at their lower terminals. In the recesses 8 expanding jaws or reamers 11 are mounted and have upper reduced shanks 12, located and having longitudinal movement in the vertical extensions 9 of the recesses, and provided with inwardly-projecting shouldered heads 13 to engage the catch projections 6 of the slide. The inner edges of the shanks 12 where they run into the main body portions of the reamers have downward and outward inclines or beveled portions 14 to cause them to fit close against the opposite side edges of the bar 7 when the reamers are closed in, as shown by Fig. 1, and the upper portions of the bodies of the reamers have angular shoulders 15 to contact with the shoulders 10 to limit the expanding movement of the reamers when the latter are free to fly out into working position. The outer edges of the reamers immediately below the shoulders 15 thereof have outward and downward inclines 16 to contact with the well casing or tube through which they pass, and thereby have the minimum transverse extent of the reamers when in closed position equal to the transverse or cross extent of the stock, whereby the reamers will be caused to freely slide through the casing or tube. To aid in this minimum contraction of the reamers, the inner portions thereof below the inclines or beveled portions 14 are formed with recesses 17, having lower downwardly and inwardly inclined walls 18 at an angle to inner vertical bearing-faces 19, extending to the lower terminals of the reamers. The lower extremity of the bar 7 is formed with a head 20, having opposite side straight edges 21, against which the faces 19 have bearing to hold the reamers firmly out in reaming position, as shown by Fig. 2. When the reamers are contracted to pass through a casing or tube, the recesses 17 receive the head 20 and the lower inclined walls 18 are below the lower end of and partially in contact with the said head, so that the reamers will easily clear the head without sticking when in position to fly out into reaming condition. The slide 3 also has a guide-socket 22 at its lower end, as more clearly shown by Fig. 4, to steady its movement over the bar 7, the latter having a shoulder 23 to limit the down-

ward movement of the said socket and slide. The spring and slide, as well as the upper shank portions of the reamers, are normally covered and made accessible by the use of a cover-plate 24, removably attached to the stock, as shown by Fig. 3, said plate being removed in Figs. 1 and 2 to give full view to the parts. The lower ends of the reamers are provided with suitable reaming-bits 25, which flare outwardly, as shown.

It will be seen that the bar 7 centrally depends from the stock and that the reaming-tools are carried by the slide 3 and movable in close relation to the said bar. Hence the bar from its construction operates to spread the reaming-tools when the slide is moved upwardly into the stock and holds the said reaming-tools in positively-expanded working positions, as clearly shown by Fig. 2.

From the foregoing description the operation and advantages of the improved device will be obvious, and by the use of the same in proper position in connection with drilling-tools the application and reliable positioning of the tubes or casings will be facilitated. The improved device is also strong and durable and comparatively inexpensive in the cost of construction. The shanks of the reamers may be readily detached from the slide at any time desired for the purpose of repair or replacement without removing pivots or other fastening devices.

Having thus described the invention, what is claimed as new is—

1. In a reaming attachment of the class set forth, the combination of a stock having a bar centrally projecting from the lower end thereof and recesses on opposite sides of said bar, an automatically-operating slide mounted in the center of the stock and movable over a portion of the said bar, and reaming-tools loosely and freely detachably held at their upper ends in the upper portions of the

recesses on opposite sides of the bar and connected to the lower end of the slide.

2. In a reaming attachment of the class set forth, the combination of a stock having a bar projecting from the lower end thereof and recesses adjacent to said bar, the latter having a lower enlarged end or head, a spring-actuated slide movable longitudinally of the stock and having the lower portion thereof engaging the said bar, the recesses of the stock providing opposite shoulders, and reamer loosely and detachably connected to the slide and having portions to engage the said shoulders and the lower enlarged end or head of the bar.

3. In a reaming attachment of the class set forth, the combination of a stock having recesses and shoulders at the lower portion thereof, a bar depending centrally from said stock and provided with a lower enlarged end with straight side edge portions, a spring-actuated slide mounted in the stock and engaging the said bar, and reamers having shanks loosely and readily and detachably engaging the said slide and provided with inner edge recesses, inclines and straight bearing portions, and outer shoulders and inclines, the portions of the reamers connected to the slide being in the form of shanks reduced in cross-section, the side edge portions of the lower enlarged end of the bar being adapted to engage the straight bearing portions of the reamers and the recesses of the latter having inclined walls fitting over and inclosing the enlarged end of the bar when said reamers are contracted.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JACOB S. BROWN.

Witnesses:

W. EDGAR MILLER,
CHAS. H. TOLL.

**Defendant's Exhibit Certified Digest of Patent
Office Records—Re Brown Patent.**

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come,
Greeting:

THIS IS TO CERTIFY that the annexed is a true copy from the Digest of this Office of all Assignments, Agreements, Licenses, Powers of Attorney, and other instruments of writing, found of record up to and including June 5, 1915, that may affect LETTERS PATENT granted to

Edward Double, Santa Paula, Cal.

[Patent No. 734,833.]

Dated July 28, 1903.

“Underreamer.”

Searched from October 9, 1899.

IN TESTIMONY WHEREOF I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the City of Washington this twenty-first day of June —, in the year of our Lord one thousand nine hundred and fifteen and of the Independence of the United States of America the one hundred and thirty-ninth.

[Seal]

J. T. NEWTON,

Acting Commissioner of Patents.

[Ten Cent U. S. Revenue Stamp. Canceled June 22, 1915. U. S. Patent Office.]

1.

Edward Double

Instrument dated Feb. 4, 1902. Recorded Feb. 2,
1903. Liber H. 66, p. 495.

Parties.

Invention.

Edward Double

Under Reamers.

to

Filed Oct. 26, 1901, Ser.

Union Oil Tool Company, No. 80,144.

Corporation of Califor- Pat. 734,833, July 28,
nia, Santa Paula, Cal. 1903.

Double grants to said Company for its sole use,
the right to manufacture, use and sell said invention,
and hereby sets over to said Company an undivided
one-half of the legal title to said invention and let-
ters patent therefor; intending that said Company
shall at all times retain said right to manufacture,
use and sell said Under Reamers, but may transfer
said legal title. Consideration \$20.

Instrument dated Jan. 16, 1903. Recorded Feb. 2,
1903. Liber H. 66, p. 496.

Parties. (Acknowledged

Invention.

Same Jan. 24, 1903.)

Under Reamers.

to

Filed Oct. 26, 1901. Ser.

Same

No. 80,144.

Allowed Jan. 5, 1903.

Pat. 734,833, July 28,
1903.

Filed Oct. 13, 1902. Ser.

No. 127,171.

Pat. 748,054, Dec. 29-03.

Filed Dec. 18, 1902. Ser.

No. 135,792.

Pat. 796,197, Aug. 1, 1905.

In consideration of covenants and agreement herein contained, Double grants said Company license to make, use and vend to others to be used, Under Reamers embodying said inventions, upon terms and conditions herein recited. Mutually agree that if Double shall cease to be connected with said Company as stockholder and officer thereof, the license herein granted shall cease to be exclusive, but said Company shall not be deprived of a right to make such Under Reamers or relieved from payment of royalty as herein provided. The license herein granted is indivisible and said Company shall not grant any license to make Under Reamers under said letters patent without Double's consent. The royalty provisions hereof shall be in effect from January 1, 1903.

Instrument dated Feb. 4, 1902. Recorded Nov. 3, 1903. Liber A. 68, p. 402.

Parties (Acknowledged Invention.

Feb. 14, 1902.) Under Reamers.

Union Oil Tool Company, Filed Oct. 26, 1901. Ser.

to No. 80,144.

Frederick Eichenhofer, Pat. 734,833, July 28,

Geo. C. Gilson, 1903.

Geo. L. Chadderdon,

Los Angeles Co., Cal.

An undivided one-half interest in said invention and letters patent to be issued therefor. Considera-

290 *Wilson & Willard Manufacturing Company*

recorded November 3, 1903, in Liber A, 68 of Transfers of Patents, at
pages 398 and 400 respectively—

tion \$10. (This deed is attached to two deeds A
~~digested in B. 34 of Digest, page 133,~~ Jacob S.
Brown, Inventor.)

Jacob S. Brown.

Instrument dated Feb. 4, 1902. Recorded Nov. 3,
1903. Liber A. 68, p. 398.

Parties (Acknowledged Invention.

Feb. 12, 1902.) Reaming-Tool.

Friedrick Eichenhofer,

Geo. C. Gilson,

Nov. 26, 1901. 687,296.

Geo. L. Chadderdon

to

The Union Oil Tool Com-
pany.

An undivided one-half interest in said invention
and letters patent.

2.

Jacob S. Brown.

Consideration recited (This deed is prefixed to
recorded November 3, 1903, in Liber A, 68, page 402, of Transfers of
Patents.

deed following ~~on Digest,~~ and to deed A ~~digested in~~
~~D. 16 of Digest, page 25,~~ first entry under Edward
Double, Inventor.

Instrument dated Feb. 4, 1902. Recorded Nov. 3,
1903. Liber A. 68, p. 400.

Parties (Acknowledged Invention.

Feb. 12 and 14, 1902.) Reaming-Tool.

Same

Nov. 26, 1901. 687,296.

to

also Edward Double.

Union Oil Tool Company,
Corporation,

Under Reamers.
Appln. Ser. No. 80,144.

Santa Paula, Cal.

Pat. 734,833. July 28,
1903.

Including Royalty Agreement.

This deed states that said Licensors this day assigned to said Company an undivided one-half interest in said invention and patent 687,296; and that said Company under assignment from Edward Double of his application 80,144, has this day assigned to said Licensors an undivided one-half interest in said invention of Double. Said Licensors hereby grant to said Company exclusive right to manufacture, supply demand for and sell anywhere in the United States of America, said reaming tool covered by patent 687,296, subject to payment of royalty herein recited for all reaming tools hereafter manufactured by said Company, either under patent 687,296 or said invention of Double, or both. This agreement shall be binding upon the heirs, administrators, executors and assigns of the respective parties hereto. Consideration \$1. By each to the other paid. (This deed is annexed to deed pre-recorded November 3, 1903, in Liber A, 68, page 402, of Transfers of Patents ~~ceding on Digest,~~ and prefixed to deed A ~~digested in~~ **D. 16 of Digest, page 25, first entry under** Edward Double, Inventor.)

Instrument dated Nov. 7, 1903. Recorded Nov. 12, 1903. Liber Z. 67, p. 498.

Parties.	Invention.
Geo. C. Gilson,	Reaming Tools.
to	Nov. 26, 1901. 687,296.
Union Oil Tool Company	and Edward Double.
	Underreamers.

July 28, 1903. 734,833,
and other inventions in
Underreamers.

Not specifically identified.

Gilson states that he owns certain interests in said patents and certain other inventions of Edward Double in Underreamers; and of any interest in license contract and agreement dated February 4, 1902, between Friedrich Eichenhofer, George C. Gilson and George L. Chadderdon, and said Company. Gilson hereby assigns to said Company, its successors and assigns, all his right, title and interest in said letters patent, and his right, title and interest, claim and demand in said license agreement; his said interest in license contract being a one-quarter interest in all royalties accruing thereunder, and all rights secured to said Eichenhofer, Gilson and Chadderdon by said license contract and the transactions and assignments forming part thereof, including in the rights so transferred to said Company, all his right, title, interest, claim and demand in any claim or claims for past infringement of said letters patent; intending hereby that said Company shall succeed to all his right, title and interest in said letters patent and under said license contract. Con-

3.

Jacob S. Brown.

sideration \$500. and agreement by said Company, as herein recited.

[Endorsed]: Defendant's Exhibit Certified Digest of Patent Office Records—Re Brown. Patent Filed Feb. 26, 1916. Wm. M. Van Dyke, Clerk. T. F. Green, Deputy.

No. 2996. U. S. Circuit Court of Appeals for the Ninth Circuit. Defendant's Exhibit Certified Digest of Patent Office Records—Re Brown Patent. Filed May 8, 1917. F. D. Monckton, Clerk.

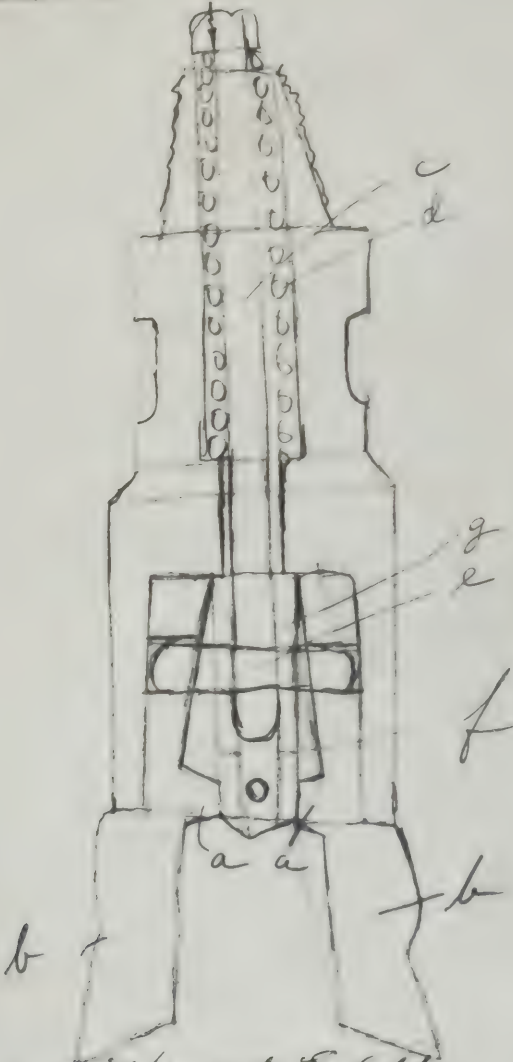
Case No. 2996

U. S. Circuit Court of Appeals
For the Ninth Circuit

Defendants Exhibit Double Reamer Pencil
Sketch by Edw. Double

Filed MAY - 8 1917

F. D. Mc C...



Defendants Exhibit

Double Reamer Pencil Section - by Edward
Double - 1916 = apt hearing Feb 26 1916

FILED

FEB 26 1916

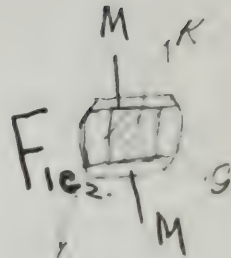
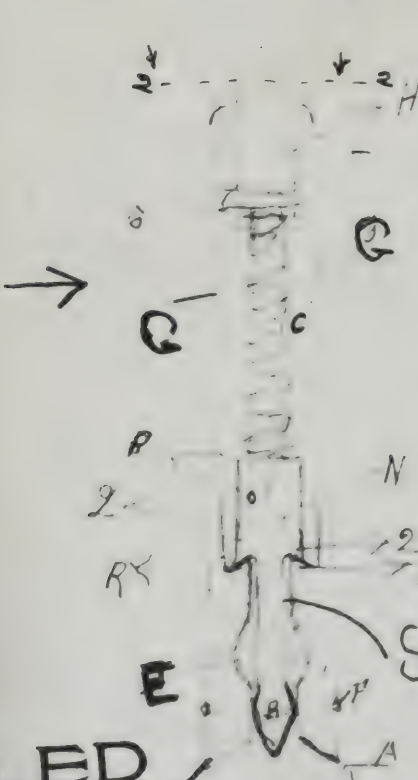
Wm. M. Van Dyke, Clerk
J. J. Hume Deputy

Edwards & Ketch
Edwards & Ketch
of Day
Reamer

FIG 1

D

K



Case No. 2996

U. S. Circuit Court of Appeals
For the Ninth Circuit

Edwards & Ketch
of Day Reamer

MAY - 8 1917

F. D. MONKTON, Clerk

FILED

APR 16 1913

A

WM. M. VAN DYKE, Clerk
By *W. M. Van Dyke*
Deputy Clerk

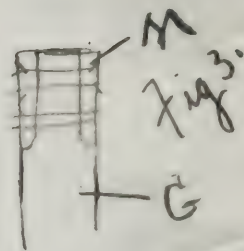
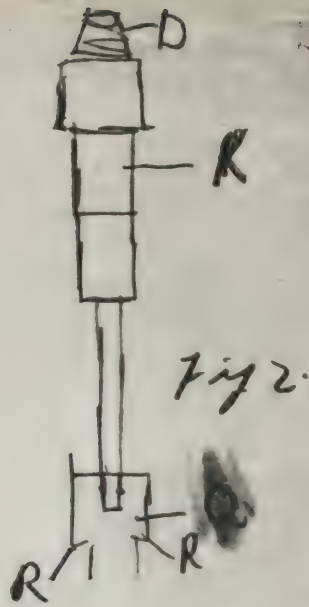
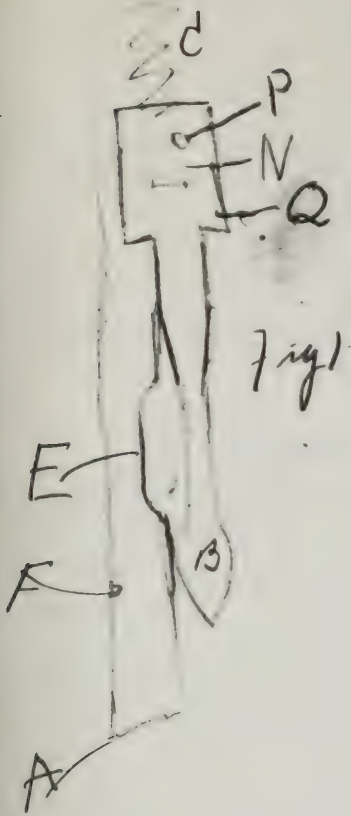
In Equity:
 United States District Court,
 Southern District of California
 Southern Division.
 Union Tool Company, et al.,
 Complainants,
 vs.
 Wilson & Willard Manufacturing
 Company, Defendant.

Certified:-

Genevieve S. Donahue

NOTARY PUBLIC IN AND FOR THE CITY AND COUNTY
OF SAN FRANCISCO, STATE OF CALIFORNIA

713



FILED

APR 16 1913

WM. M. VAN DYKE, Clerk

By Wm. M. Williams Deputy Clerk

Case No. 2996

S. Circuit Court of Appeals
For the Ninth Circuit

Eastwood Partial

Sketch of Day Reamer

Filed MAY 28 1917

F. O. MENCITOR, Clerk

Lefts &
Eastwood
Partial Sketch
of Day Reamer

In Equity
 United States District Court, Southern
 District of California, Southern
 Division

Union Tool Company, et al.,
 Complainants,

Wilson & Willard Manufacturing
 Company, Defendant.

Certified: - *James S. Donahue*

*United States Circuit Court of Appeals for the
Ninth Circuit.*

No. 2996.

WILSON & WILLARD MANUFACTURING
COMPANY, a Corporation,

Appellant,

vs.

UNION TOOL COMPANY, a Corporation, et al.,
Appellees.

Designation Under Rule 23.

Agreeably to the provisions of Subdivision 8 of Rule 23, of the Rules of Practice of this Court, the original exhibit marked "Oil Well Supply Co., Pittsburg, Pa., U. S. A." in red cover nor any part thereof need be printed or reproduced.

San Francisco, California, May 8th, 1917.

RAYMOND IVES BLAKESLEE,

Counsel for the Appellant.

Received a copy of the above designation this 9th day of May, 1917.

FREDERICK S. LYON,

Counsel for Appellees.

[Endorsed]: No. 2996. United States Circuit Court of Appeals for the Ninth Circuit. Wilson & Willard Mfg. Co. vs. Union Tool Company. Designation Under Rule 23. Filed May 10, 1917. F. D. Monckton, Clerk.

[Endorsed]: Printed Book of Exhibits. Filed May 26, 1918. F. D. Monckton, Clerk.



No. 2996

IN THE

United States Circuit Court of Appeals

For the Ninth Circuit

WILSON & WILLARD MANUFACTURING COMPANY,	<i>Appellant,</i>
VS.	
UNION TOOL COMPANY, et al.,	<i>Appellees.</i>

APPELLANT'S OPENING BRIEF

RAYMOND IVES BLAKESLEE,
*Solicitor and Counsel for Defendant-
Appellant.*

Filed

MAY 12 1917

Filed this.....day of May, 1917. **F. D. Monckton,**
Clerk.

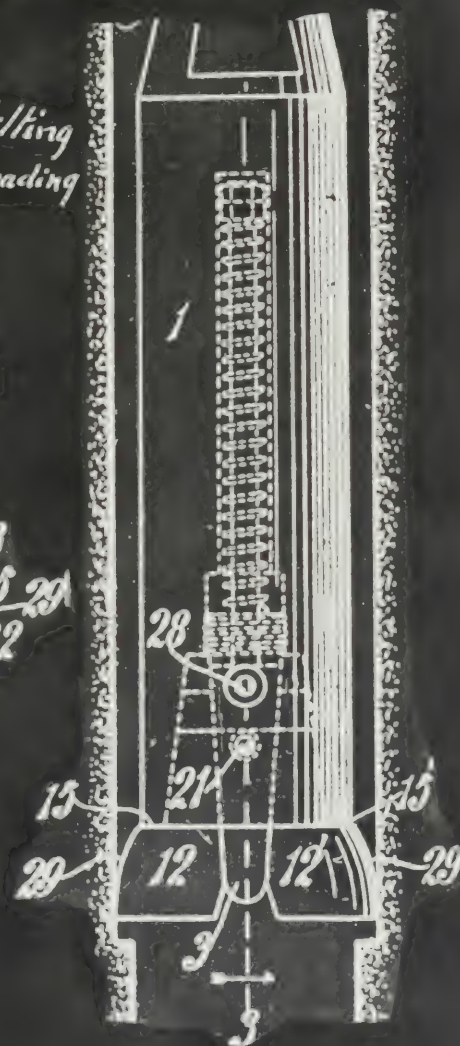
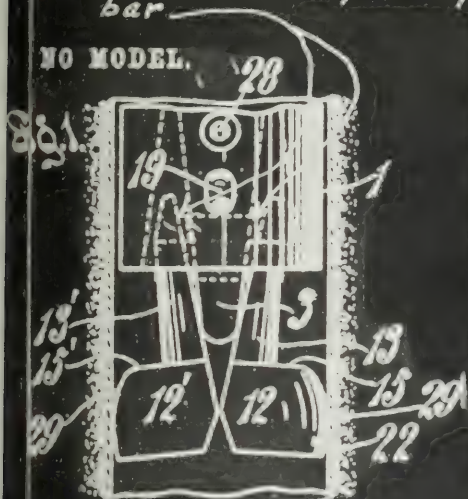
FRANK D. MONCKTON, Clerk.

By..... Deputy Clerk.

O'Donnell and Willard

Cutters Shown tilting
from central spreading
bar

NO MODEL.



Middle Joint

Swan Underreamer

Shee contact point high

open Cutter way

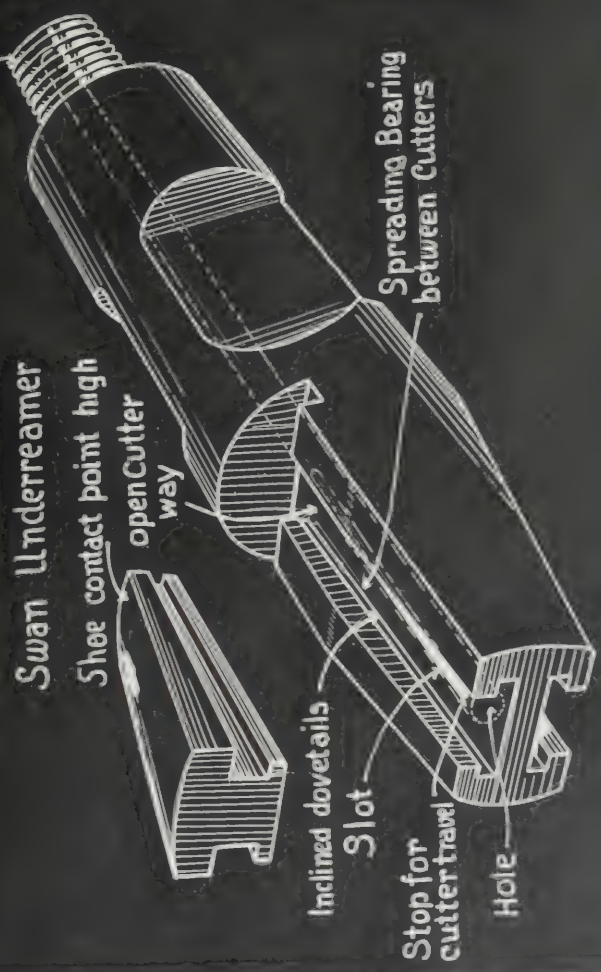
Spreading Bearing
between Cutters

Inclined dovetails

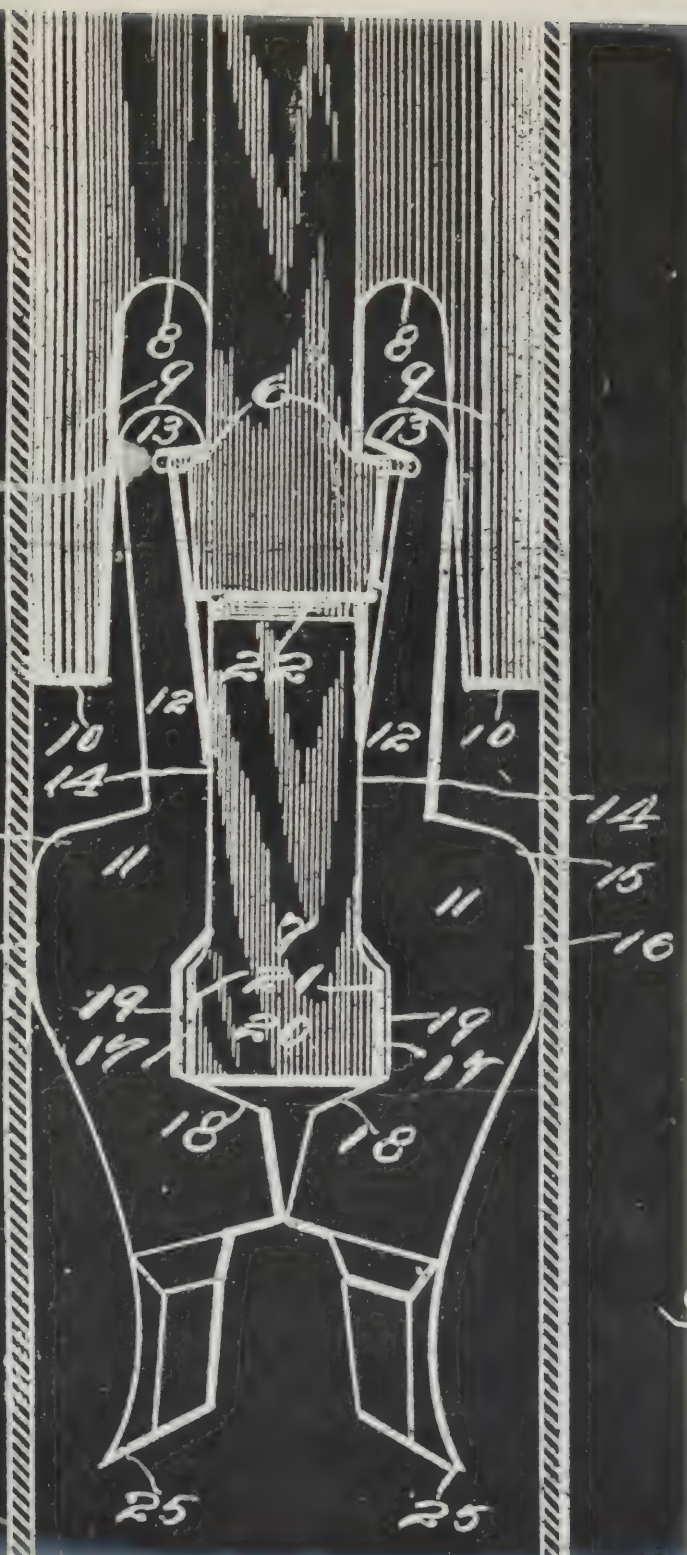
Slot

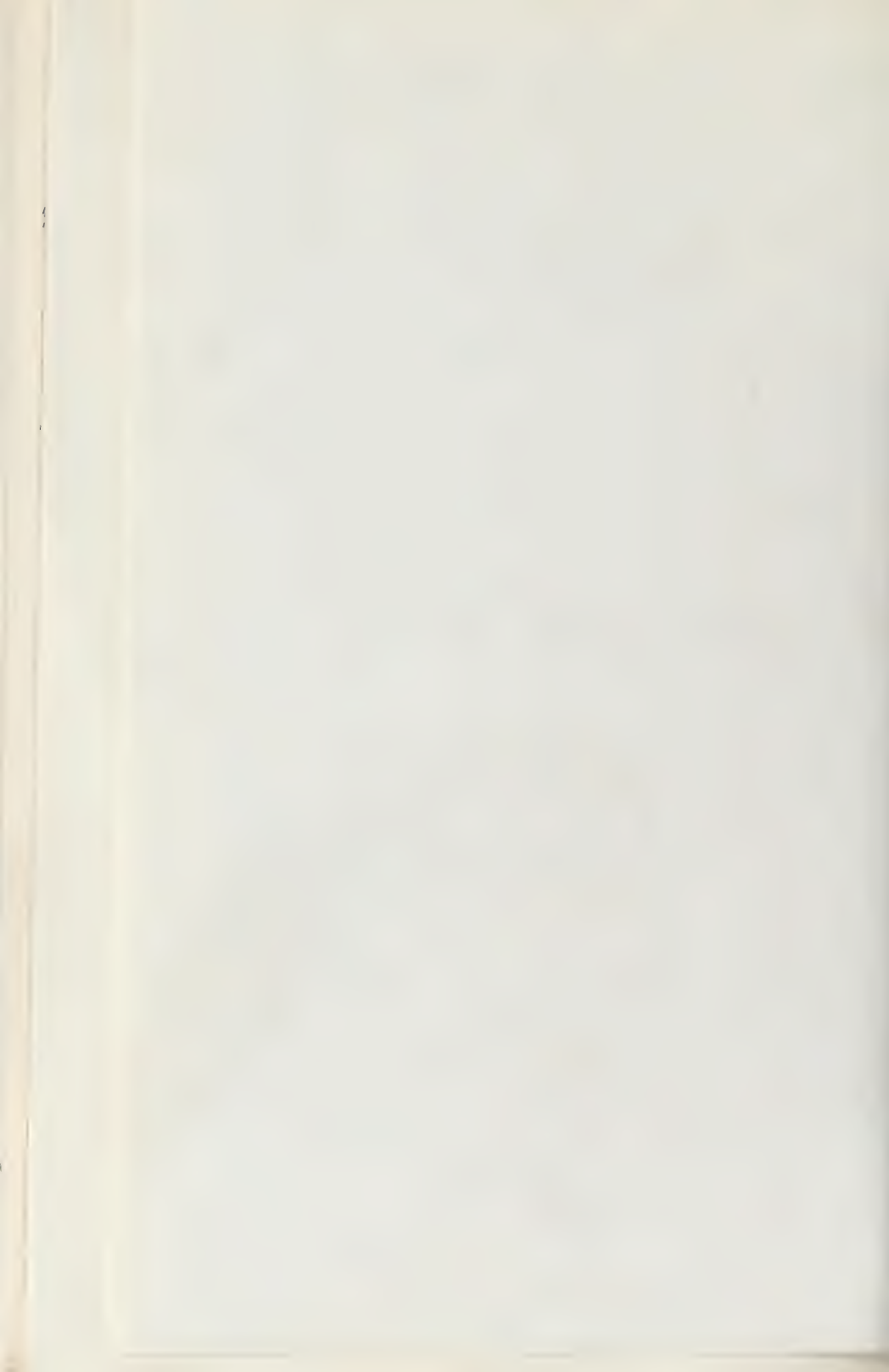
Stop for
cutter travel

Hole

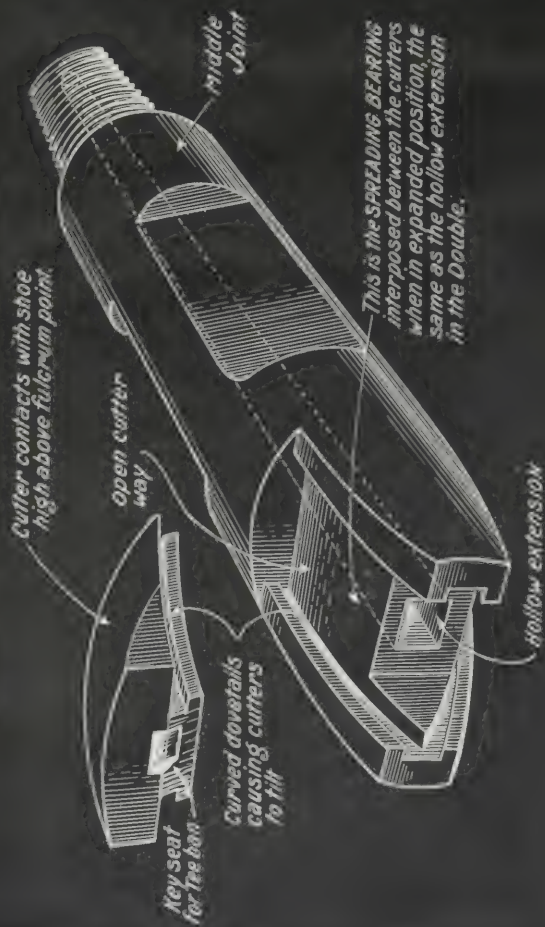


Brown Garner showing cutters interlocked to the
projections 5-6 preventing cutters travel independent
of tee bar.





JONES ROUND NOSE



Jones Round Nose Reamer.



Shoe contact point

Curved dovetails

Extreme lower end
of hollow extension
interposed between
cutters -

Cutters collapsed showing that
all during collapsion the cutter
is tilting over the lower end of
the hollow extension partaking
of the same tilting action as
the Double -

Middle Joint

Double Underreamer

Shoe Contact point

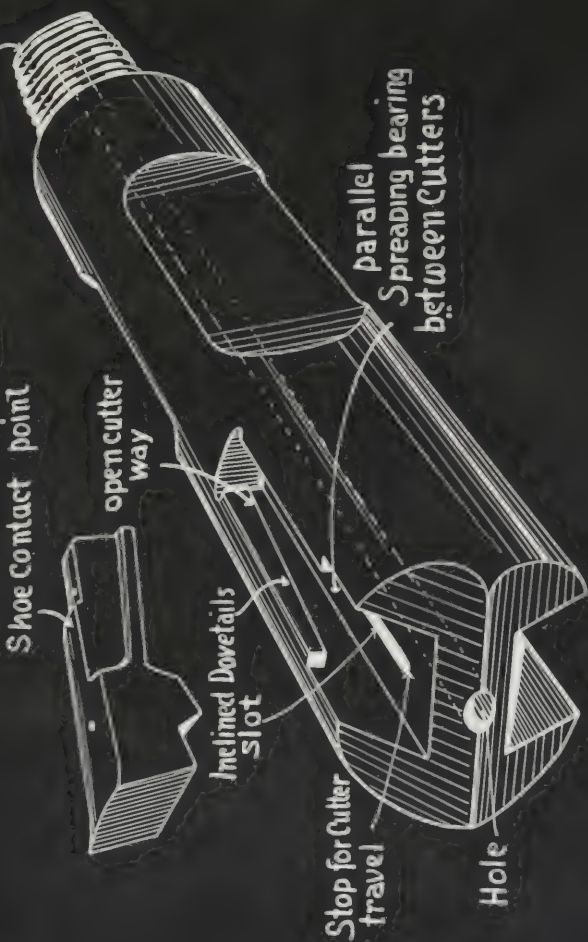
open cutter way

Inlined Dovetails slot

Stop for cutter travel

Hole

parallel Spreading bearing between cutters



Cutter retaining means are merely ribs or right angle projections and are not grooves or dovetails as in the Double, Swan or Jones.

Ribs are parallel, not inclined, as are the dovetails in the Double Swan or Jones.

no middle joint.

no hollow or Slotted extension
no bearing or part of the body between Shanks of cutters



No. 2996

IN THE

United States Circuit Court of Appeals

For the Ninth Circuit

WILSON & WILLARD MANUFACTURING COMPANY,	<i>Appellant,</i>
--	-------------------

vs.

UNION TOOL COMPANY, et al.,	<i>Appellees.</i>
-----------------------------	-------------------

APPELLANT'S OPENING BRIEF

This case comes before your Honors on an appeal taken by the defendant Wilson & Willard Manufacturing Company from an interlocutory decree entered in the lower court in favor of complainants and finding the Double patent No. 734,833, valid and infringed as to claims 1, 2, 6, 7 and 8, the charge of infringement of claims 3, 4 and 5 having been withdrawn by the complainants upon the trial and argument.

The interlocutory decree provided for the usual injunction against the defendant-appellant, and for an accounting of profits and damages in favor of appellees-complainants, and awarded costs to complainants.

The appellee corporation and the appellant are, and at all times mentioned in the pleadings and proofs have been, engaged in the manufacture of reamers for the enlarging of oil-well holes, and between them have practically monopolized this business in the United States and particularly the important California fields, and the appellant has likewise largely monopolized the underreamer business in foreign oil fields.

SPECIFICATION OF ERRORS

First. The Wilson, or appellant's underreamer, is an entirely new form of an underreamer embodying features new and not disclosed in any other types preceding it. Its mode of operation is different. Its construction is such that entirely different and better results in the co-action of its parts are produced, and the underreamer operation accordingly facilitated thereby. Its principal and new features were entirely new and are covered by basic claims—broad claims—the nature of which is not to be found in appellees' patent.

The Wilson underreamer does not include the fundamental elements of the Double underreamer, namely, the "hollow slotted extension" of any design, much less "hollow slotted extension" with opposite parallel bearing faces with upwardly and inwardly inclined dove-tailed ways, the very elements upon which the Double underreamer patent is based, as the Court will observe.

The cutters of the Wilson underreamer have no "inward projections," the means employed by the Double underreamers for expanding its cutters. On the contrary, the Wilson cutters are provided with entirely different means, namely, laterally extended shoulders on the body of the cutters to co-act with downwardly projecting lugs, at the extreme lower end of the Wilson reamer body, both of which elements are entirely absent in the Double patent underreamer. Numerous other features of construction found in the Wilson underreamer, differing radically from those disclosed by the underreamer of appellee's patent, will be found.

Second. That the Double underreamer was merely a transitory step in the art. Less than six per cent. of the underreamers appellee has manufactured and sold, as shown on the accounting in this case, conform to the specifications and drawings, and limited step in the art, reflected by the specific claims of the Double patent;

That said Double underreamer was, in effect, abandoned by the appellee corporation's predecessor long before the said corporation came into existence; and the appellee corporation, as shown on the accounting, used such patented Double reamer in less than six per cent. of its reamer business as stated; that such abandonment was occasioned by the unprecedented success of the Wilson underreamer, which underreamer promptly superseded the Double underreamer, making it necessary for the prede-

cessor of the appellee corporation to appropriate important features of the Wilson underreamer, in order that they might more successfully attempt to compete with the Wilson underreamer;

That such new form of alleged Double underreamer, namely, the new combination Double-Wilson underreamer which it has been producing, although a great improvement over appellee's original type being still unsatisfactory, it was found necessary to appropriate still more of the Wilson elements and to more closely imitate the form, construction and appearances of the Wilson underreamer, which appellee did as will appear in case 2918. The appellee's action in so doing, we regard as conclusive proof that the Wilson underreamer contained new and novel elements and combinations not disclosed in the Double reamer, nor contemplated by the patentee, and which entirely differentiate it from the Double underreamer invention and place it completely beyond the scope of the limited combination claims of the Double patent;

That, therefore, the Double invention did not take the last important step in, nor did it standardize, the underreamer art, and that, therefore, the lower court erred in even implying that the Double patent was in any sense basic, pioneer or comprehensive in its position in the art or in its scope; and in allowing the trivial transitory Double invention such an unprecedented extension of the application of the doctrine of equivalents in determining the effect of its claims.

Three. That the decision of the lower court was based upon erroneous conclusions—erroneous because of a complete failure on its part to comprehend, much less understand, the construction, interrelation of parts, and mode of operation of underreamers ante-dating the Double underreamer, and many important ones of which were known by Double, such as, the O'Donnell and Willard reamer, with its tilting cutters and “hollow slotted extension”;

Or the Jones round nose underreamer, with its “open dove-tailed slip-ways and with its dove-tailed cutters co-acting therewith, its hollow spreading extension interposed between the cutter, its shouldered cutters projecting through the dove-tailed slip-ways and having shoulders to co-act with the casing shoe high above their fulcrum point, such cutters tilting over its interposed spreading bearing or hollow extension, and which tilt is permitted by the curvature at the back of the cutters identically as the tilting of the Double cutter is permitted by the “V”-shaped curve at the back of its cutter, and further by its upwardly and finally inwardly inclined dove-tails of the slip-ways;

Or such as the Brown underreamer, whose tilting cutters were fixedly attached to their suspension means, thus directing each cutter either upwardly or downwardly with the travel of its means. The Court did not understand that action, and explained that because it did not have such connection, it differed from the Double underreamer in this tilting action;

however, he admitted that in all other respects the Brown invention was an anticipation of the Double invention in regard to the tilting action of the cutters;

And such as the Canadian underreamer with its swinging cutters collapsing by means of its "V"-shaped groove at the back of its cutters, swinging over the lower end of the "hollow slotted extension"; or such as the Swan invention with its dove-tailed open slip-ways, with dove-tailed cutters co-acting therewith, and with shoulders projecting through such open dove-tailed slip-ways to contact with the casing shoe to produce collapsion;

Or, such as the Day patent reamer, with its spring-actuated cutters swinging and collapsing over the interposed spreading bearings;

Or, such as the Edward North reamer covered by patent No. 674,793, with its cutters suspended on a spring-actuated rod, said cutters having "enlarged key-seats" for the reception of the rod head or suspension means, and by which "enlarged key-seats" the cutters are permitted to "tilt" just as do the cutters of the Double;

Or, such as the Kellerman covered by patent No. 679,384, whose cutters have "enlarged key-seats" permitting them to tilt when collapsing or expanding, just as do the cutters of the Double;

Or, of numerous other reamers disclosing one or more of the elements claimed by appellees as producing a construction original with Double.

Fourth. That Double, the patentee of the patent in suit, was not the original and independent inventor of any material or substantial part of the combinations claimed in the patent in suit, or of any of such combinations themselves, as covered by the claims found infringed; but that, on the contrary, either one Frederick W. Jones was the original inventor thereof, or that Double and Jones were the joint inventors thereof, and that Double surreptitiously and unjustly obtained the patent in suit, having appropriated such sole or joint inventions of Jones, under the pleadings of this case pursuant to U. S. R. S. 4920.

Five. That the Court has found that the heart of the Double invention was the "open dove-tailed slip-ways" with "dove-tailed cutters" co-acting therewith and means for expanding the cutters and to cause them to tilt on the suspension means; that in view of anticipatory matter previously mentioned such finding was an error; that such combinations were old in the art. However, had such combinations been new and novel with Double, the Court erred in finding such combinations covered by any claim or claims of his patent for the reason that claims 2, 6, 7 and 8 make no mention whatever of dove-tails, and claim 1 (claims 3, 4 and 5 being voluntarily abandoned by appellees), claims dove-tails of only a certain form, namely, "upwardly and inwardly inclined" and even that form limited to a combination with the underreamer having a downward extension with opposite parallel bearing faces, having a key

way therein, as well as other limitations, such as the shoulder in the hollow mandrel and a key mounted in a rod and in combinations with slips (or cutters) being furnished with inward projections to slide upon the downward extension of the mandrel to spread apart the cutting edges of the slips when the slips are drawn up; *every one of which limitations is entirely absent in the Wilson underreamer construction.*

That the said Double patent claims are so limited in scope by language so clear and so unequivocal that their meaning obviously indicates that the patentee intended to cover nothing other than the particular form and co-relation of elements specifically mentioned and set forth therein; and as still further proof of intentional restrictions and limitation of his patent, the file wrapper and contents afford ample proof, as for instance in the substitution of narrower claim 7 for the only relatively broad claim ever presented in the case, and after the citation of prior patents by the patent office. Still further proof of the extremely narrow margin of invention, if any, made by Double, is made clear by appellee's abandonment of claims 3, 4 and 5, which claims are no narrower in scope than the claims relied upon. If the Wilson invention does not infringe claims 3, 4 and 5, as they admit, there can be nothing remaining in claims 1, 2, 6, 7 and 8, to be infringed. It must be then that the appellant's underreamer is to be measured in infringement by the difference between claims 1, 2, 6, 7 and 8, on the one hand, and

claims 3, 4 and 5 on the other hand. If the Double patent, therefore, is to be so construed, the Wilson reamer cannot infringe because it does not contain such narrow structural difference.

We assert that by the residue or remainder of matter of claims 1, 2, 6, 7 and 8, after deducting the matter contained in claims 3, 4 and 5, appellees utterly fail to cover the matter found by the lower court to have been invented by Double. Furthermore, such residue of matter cannot possibly be infringed by the Wilson reamer. Proceeding further within the same logic, what reason is there to find infringement as to claim 1, limited to inwardly and upwardly inclined slip-ways which appellant does not use, any more than to find infringement of claim 3 limited to a notched key which appellant does not use. Certainly the doctrine of equivalents cannot be so distorted and made so abnormally flexible as to bring the Wilson pronged type of under-reamer with its radically different forms and relation of parts within the scope of the claims of the Double patent.

Sixth. That in the event it were proper to concede to the Double patent any material scope, Double was not the true and first inventor of such matter, inasmuch as certain of the Double patent claims, if construed in any but the most narrow and specific manner, clearly interfere with certain of the claims of the O'Donnell and Willard patent, application for which was co-pending with application for the

Double patent and was filed prior to the application of the Double patent; so that O'Donnell and Willard must be found the true and first inventors of any such common subject matter. This contention likewise applies to the Brown patent, the application for which was co-pending likewise with the O'Donnell and Willard and Double applications and filed before the Double patent application; and the fact that the patent office did not declare any interference between the Double and the Brown and O'Donnell and Willard applications raises the presumption under the law that the Double invention consisted only in the minute differences between its specific self and the specific subjects of said other patents, and that its claims must be correspondingly most narrowly construed to the exact construction and inter-relation of parts disclosed in its specifications and drawings.

Seventh. That the present suit, originally brought in 1908, dismissed for want of prosecution in 1910, and allowed to lie without prosecution, after refiling, until 1912, is merely a proceeding to harass the defendant, of a like kind with that suit finally disposed of by your Honors 227 F. R. 607, entitled "*Wilson and Willard Manufacturing Company, et al. vs. Double and Bole.*"

BRIEF OF ARGUMENT

Much time has been consumed in the taking of testimony in this case in showing that each part of the Double underreamer, covered by Patent No. 734,833 and which is the subject of this suit, was old in the art and, therefore, could not be claimed as an invention by Double or his collaborators. The evidence brought out by the appellant to show that all of the elements of the Double combination patent were old in the art became so convincing that eventually the appellee on the argument abandoned his contention that he was the inventor of these elements and admitted that his patent claims covered combinations only, each of which was made up of elements previously known in the art of oil well underreaming. Obviously, therefore, the point for this Court to decide is *whether or not* the *appellees* have proven beyond a doubt that the Wilson underreamer, Patent No. 827,595, *infringes these claims for combinations* of elements.

In the consideration of this question we rely upon those doctrines which have been well established in patent law and which will be set forth herein.

The claims of invention, if any, in the Double patent must be limited to the specific combinations of elements as covered in the claims of said patent and these claims are all combination claims. The law presumes that all the elements of a combination claim are old and that the invention covered by such

claims resides in the whole combination considered as an entirety or as a unitary structure.

“A claim for a combination carries with it an implication that the separate elements are old.” *Westinghouse vs. Edison Electric Light Company*, 63 Fed. 592.

“A combination is always an entirety.” *Schumacher vs. Cornell*, 96 U. S. 554.

“The point to be emphasized is that the law looks not at the elements or factors of an invented combination as a subject for a patent but only to the combination itself as a unit distinct from its part. * * *” *Yesbera vs. Hardesty Mfg. Co.*, 166 Fed. 125.

These points are admitted in the appellee's brief before the lower court in the following words:

“Defendant's attempt to harp upon the fact that complainants concede that each element (of the Double combination patent) was old. The fact that the claims are for a combination expressly admits this in law.”

He then cites, *Hopkins on Patents*, Sec. 137, p. 214:

“Rule XXXVII. In a combination claim each element is conclusively presumed as a matter of law to be old, whether old in fact or not. The foundation of this rule is, that if, among the elements, there is one which is itself patentably new, it must be separately claimed, or it is dedicated to the public by its inventor's failure to claim it. Thus Judge Baker has said: ‘The failure to claim either one of the elements separately raises the presumption that no one of them is novel.’ *Campbell vs. Conde Implement*

Co., 74 Fed. Rep. 745. And Judge Woods has said: 'When a combination is claimed there arises an implied concession that the elements are old, and not separately patentable.' *Hay vs. Heath Cycle Co.*, 71 Fed. Rep. 411-413."

Appellee further states in his brief before the lower Court:

"A combination claim is an entity; each element is merely an integer."

He then quotes:

"A combination is a composition of elements, some of which may be old and others new, or all old or all new. It is, however, the combination that is the invention, and is as much a unit in contemplation of law as a single or non-composite instrument. * * *" *Leeds & Catlin Co., vs. Victor Talking Machine Co.*, 213 U. S. 301, 318.

In view of the above citations and the quotations from the appellee's brief before the lower Court there can be no doubt that the appellee understands and admits these fundamental principles of Patent Law, viz.: That the only claim to invention in the Double patent resides in the combination of elements, old in the art, and which combination is described and limited by the claims in said patent, and that this combination must be considered as an entirety or unitary structure.

It follows as a corollary of the above doctrines that, in order to prove infringement of a combination claim, it must be shown beyond a reasonable doubt that *the entire combination*, as a unitary structure,

having substantially the same mode of operation, must be present in the alleged infringing device. Both must contain the same elements and have substantially the same mode of operation. If the elements are the same in both combinations and the respective modes of operation of the two combinations are different, then there is no identity between the combinations; if the mode of operation is identical but obtained by a different combination of elements, here also infringement is negatived. These are also fundamental principles of Patent Law in substantiation of which numerous authorities could be cited.

“We know of no authority where a defendant has been held as an infringer of a combination claim where he omits three of the elements of the combination. If the defendant omits one or more of the elements which make up the combination he no longer uses the combination. It is no answer to assert that the omitted elements are not essential and that the combination operates as well without as with them.” *Evans et al. vs. Hall Printing Press Co.*, 223 Fed. 539.

“An infringement involves substantial identity, whether that identity be described by the terms ‘same principle,’ same ‘*modus operandi*,’ or any other. * * * *The argument used to show infringement assumes that every combination of devices in a machine which is used to produce the same effect, is necessarily an equivalent for any other combination used for the same purpose.* * * * *This is a flagrant abuse of the term ‘equivalent’.*” *Burr vs. Duryee*, 1 Wall. 531, 572. (Cited in *Westinghouse vs. Boyden Power Brake Co.*, 170 U. S. 568.)

“To make one mechanical device the equivalent of another it must appear not only that it produced the same effect, but that such effect is produced by substantially the same mode of operation.” 5 Bann. & A., 4. See Walker on Patents, Sec. 353, and cases there cited.

We will next attempt to arrive at a definite understanding of the combination of elements covered by the Double patent together with their mode of operation. It is essential that the elements making up the Double combination should be kept in mind and their mode of operation should be clearly understood. *The lower Court failed to grasp the distinction between the elements comprising the Double combination and the mode of operation of the combined elements.* The consequence is that the lower Court in describing the Double invention as the “*tilting of the cutters,*” which is a mode of operation, combined with the “*interrelated dovetails,*” which is an element of the combination, shows plainly that it failed to understand either the Double combination or its mode of operation. Unless this distinction is kept clearly in mind, no intelligent comparison can be made between the Double patent and any other underreaming device and the logic of this statement will be obvious when it is remembered that, in order to establish infringement of the Double patent by the Wilson device, *the appellee must show that they are combinations made up of the same elements and that their mode of operation is substantially identical.* The above citation (*Evans et al. vs. Hall Printing Press Co.,*

223 Fed. 539) reiterates the legal principle that, regardless of the similarity of the modes of operation of two combinations, if one of them omits one or more elements of the other combination, infringement is negatived. On the other hand it was held by this Court in *Western Engineering & Construction Co., vs. Ridsen Iron & Locomotive Works*, 174 Fed. 224, that notwithstanding the defendant's gold dredger contained all the elements of the claim charged to be infringed, *there was no infringement because defendant had, in its dredger, changed the co-operative inter-relation of such elements, thus changing the mode of operation of the device.* There being no identity between the respective modes of operation, there was, of course, no identity between the two devices and, therefore, no infringement, and this Court, speaking through your Honor Judge Gilbert, so held.

In its decision the lower Court explains its views of the features which make up the Double combination in the following language:

“A hollow mandrel with inner shoulder; a downward extension with a shoulder at the side of the extension; a spring on the shoulder in the hollow mandrel; a rod playing in the mandrel supported by the spring, and a key at the lower end of the rod to carry the cutters were, in such combinations, all old in the art. *The chief novel feature of the Double invention was the tilting means adopted for the collapse and expansion of the cutters—in combining that means with inter-related dovetails on the cutters and ways of the body extension.*”

Also the lower Court states in its decision:

“None of the underreamers of the prior art combine cutters tilting over the lower end of the reamer body with shanks having dovetails so inter-related with dovetail ways upon the body of the reamer as to afford inner, outer and lateral bearings when in the reaming position.”

At this juncture, and before proceeding further, we deem it highly important to direct the attention of this Honorable Court to the very significant finding of the lower Court, just quoted above, and which we here again quote for the purpose of fully considering its true import.

“The chief novel feature of the Double invention was the *tilting* means adopted for the collapse and expansion of the cutters—in combining that means with inter-related dovetails on the cutters and ways of the body extension.”

“None of the underreamers of the prior art combine cutters tilting over the lower end of the reamer body with shanks having dovetails so inter-related with dovetail ways upon the body of the reamer as to afford inner, outer and lateral bearings when in the reaming position.”

We here have the very heart of the findings upon which Judge Cushman of the lower Court relied when determining that the Wilson reamer infringed appellee's patent.

We submit, your Honors, that it can be readily determined that, in view of this finding the lower Court grievously erred in his opinion.

The feature of the “*tilting* means adopted for the collapse and expansion” of the Double cutters, was, as will be pointed out, old and not the invention of Double, and what is of much greater importance at this time is that the Wilson reamer *does not employ any such tilting means.*

Again, the lower Court finds that “none of the underreamers of the prior art combine cutters tilting over the lower end of the reamer body with shanks having dovetails so inter-related with dovetail ways upon the body of the reamer as to afford *inner, outer and lateral bearings* when in reaming position.”

Now, please observe that the shouldered cutter ways on the body of the Wilson reamer (not dovetails) cannot under any circumstances be so inter-related with the shoulders on the shank of the cutters as to afford *inner bearings* when in reaming position, nor when collapsed or when in any position whatsoever, *for the simple reason that there is no metal in the Wilson reamer* where there would have to be for that purpose—simply open space.

Even a casual examination of the form of the cutter ways of the Wilson reamer will readily reveal the striking fact that there is nothing on the body interposed back of the cutter retaining shoulders, viz.: between them.

In fact such an inter-relation of dovetails as is disclosed by the Double reamer would require a very

extensive reorganization of the Wilson parts and omissions as well as additions thereto, otherwise the cutters would be incapable of collapsing or expanding.

It is clear that the lower Court simply did not understand the construction of the Wilson reamer. The only intrust bearings between the shanks of the Wilson cutters are the detachable block (7) of Wilson No. 1, or on the T-head of the Wilson No. 2.

Here we find differences in construction, and interrelation of parts and in modes of operation and of function of elements so pronounced as to completely negative any possible charge of infringement of the combination stated by the lower Court to be the "chief novel feature of the Double invention." In short, we find absolute absence in the Wilson reamer, of the "tilting means" of the Double reamer, and of the "inter-related dovetails" of the Double reamer for any purpose whatsoever, much less to form "inner bearings when in reaming position."

Later in this brief we will show that this hypothetical combination *is not covered by any of the claims in the patent in suit and, therefore, cannot possibly be regarded* as the combination that the patentee, his collaborator Jones, and his attorney, who is the opposing counsel in this action, had in mind when they drew up these claims. First, however, we will direct the attention of the Court to the

feature of the "tilting means adopted" (by the designer of the Double underreamer) "for the collapse and expansion of the cutters." Strangely enough the lower Court concludes that Double invented this "means." This is so conclusively disproven by the evidence and exhibits in this case that this astounding conclusion can be explained only on the ground that the lower Court failed signally to understand the technique of the several exhibits revealing this feature. It would probably be unnecessary to enlarge upon this matter if it were not that the lower Court virtually decided the case upon this point.

Even a casual examination of the exhibits will show that several of them, notably the Brown patent, the Jones round nose reamer and the O'Donnell & Willard patent, each contained this feature of the *tilting cutters* and that this action in the Brown patent, No. 687,296, which antedated the Double patent, is identical in every detail with the *tilting action* of the *Double combination*. The following statement from the decision of the lower Court will show that the Court failed altogether to understand the action of this Brown underreamer:

"In the Brown patent, upon which the claim was first rejected, the means for holding the cutters in expanded position, over which they were allowed to collapse, appear the equivalents of the Double invention; but the means by which the cutters were carried on the rod were essentially different.

"It is necessary that they be so freely sus-

pended on this rod as to permit them to tilt forward and back; over and upon the lower end of the extension. In the Brown device, this was accomplished by an inwardly projecting shoulder upon the upper extremity of the cutter, fitted or hanging on a shelf or shoulder extending from the spring-actuated box into the cavity provided for the accommodation of the cutter shank.

“In the Double device, the key carried by the rod loosely fits in the hole in the upper part of the inner face of the cutter shank. In operation, as the rod carries the cutters up into the reaming position, the cutters will travel together, for the rod, with the aid of the key inserted in each shank, would control each cutter. But, as the box, upon which the cutters hang in the Brown device, travel downward, the cutters do not, necessarily, travel with it, save by their own weight. The expansion on the end of the rod would keep them from falling out, but it would not bring them down with it, together.

“The foot of the casing, which forces the cutters down in collapsed position, might become jammed out of shape, so as not to be uniform on both sides, or rocks or other substances might get between the foot of the casing and the outer shoulder of the cutter, resulting in one cutter being carried down ahead of the other, if anything interfered with the descent of the other.

“This shows such a difference in the method of operation as to prevent anticipation of the Double invention by Brown. It is, therefore, obvious that, as Brown invented one ‘means’ and Double another ‘for tilting the slips’; the Commissioner of Patents rightfully rejected Double’s broad claim for all means ‘for tilting the slips,’ which would have included the means invented by Brown.”

Now the drawings accompanying the Brown patent (and which will be found among the exhibits in this case), are perfectly clear and they prove positively that the whole of the above statement is based upon an entirely erroneous conception of the Brown patent. In the Brown device the means by which the cutters were carried on the rod was *not* in the action accomplished by an inwardly projecting shoulder on the upper extremity of the cutter, fitted or hanging upon a shelf or shoulder extending from the spring-actuated box into the cavity provided for the accommodation of the cutter shank. On the contrary the drawings plainly show that this shoulder or lug on the spring-actuated box fitted *loosely* into a pocket, slot or keyway in the cutter shank, and both cutters or slips *do*, necessarily, travel downward as well as upward in conformity with the same movement of the spring-actuated box. Also, as these cutters are positively controlled by the movements of the spring-actuated box, it would be impossible for one cutter to be "carried down ahead of the other." Also the keyway or pocket is made larger than the lug, pivot key, or shoulder in order "to permit the slips or cutters to partake of a tilting action" which is plainly illustrated in the patent drawings.

On this point we quote as follows from the testimony of the patentee appearing at R. p. —, as follows:

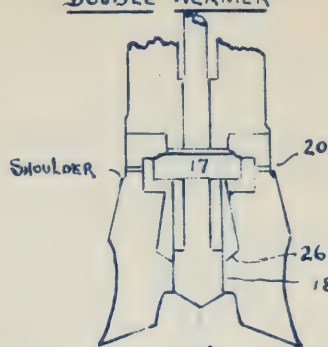
"My reamer had a tilting action, the cutters tilt on the keys so as to allow the cutters to close



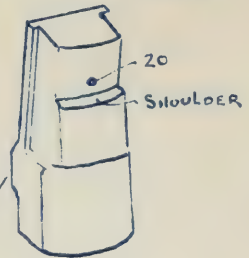
BROWN CUTTERS

NOTE POCKET

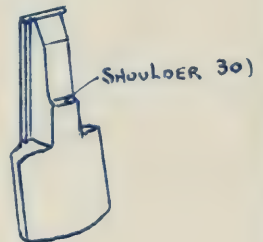
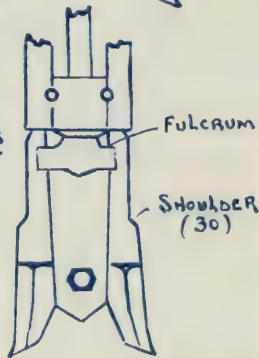
DOUBLE REAMER



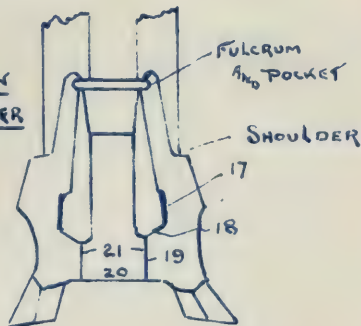
DOUBLE CUTTER



WILSON REAMER



BROWN REAMER



around the end of the underreamer, so as to collapse.”

Also R. p. —, as follows:

“They” (cutters) “would slide in and out so as to allow the cutters to partake of a tilting action around this central spreading bar of the reamer.”

This makes it clear that the cutters of the Double patent are suspended so as to produce the same sliding action as occurs with the cutters of the Brown patent and that, therefore, Double produced nothing novel in this respect over the Brown patent, an underreamer constructed in accordance with which, as the record shows, was in possession of Double prior to the alleged Double invention.

This feature is referred to in the claims of the Brown patent as follows:

“Claim 1. * * * and reaming tools *loosely* and *freely* detachably held at their upper ends in the upper portions of the recesses on opposite sides of the bar and connected to the lower end of the slide.”

“Claim 3. * * * and reamers having shanks *loosely* and *readily* and *detachably engaging* the said slide * * *”

The drawings plainly showing this contrivance would be sufficient evidence, in the eyes of the law, that the device had been previously patented even if it were not accurately described in the patent specifications.

“The state of a particular art, at the time of a particular invention, includes whatever inventions, belonging to that art, had already been invented and used in the United States, or patented, or described in any printed publication, in any country. And an invention is patented in the eyes of this law, where it is fully shown in the drawings of a patent, though not described in the specification.” Walker on Patents, Section 184.

“Every inventor or constructor is presumed by the law to have *borrowed* from another, whatever he produces that was actually first invented and constructed or used by that other, in the United States; or was previously patented or described in any printed publication in any country, after having been invented by another.” Walker on Patents, Section 43.

“A drawing, in a prior patent or printed publication, if its meaning is really undeniable, may negative novelty in a later patent on a machine, manufacture or design.” Walker on Patents, Section 56, citing *Britton vs. White Mfg. Co.*, 61 Fed. 96.

Correcting this grievous misconception of the Brown patent by the lower Court, we may safely assume that Brown invented one “means” for “tilting the slips” and Double *used that* “*means*” in his device.

As establishing this see the following testimony of the patentee Double at R. p.—, as follows:

“XQ-182.

A. The Brown had no key for the cutters to slide on.

XQ-183. However, the upper ends of the cutters would slide upon the parts you call the brackets in the Brown device; is that not so?

A. Yes."

Had Double invented a means of tilting the slips he would have put in a separate claim to cover it and we may reasonably assume that his claim would have been allowed by the Commissioner of Patents.

Again, in his decision, the lower Court says:

"The Brown reamer (No. 687,296) is, doubtless, the closest in essential principle of anything in the prior art to the patent in suit, for the cutter is adapted to both slide upon an interposed portion of the body, provided with parallel bearing faces for that purpose, and as the cutters slide down upon this face, they collapse inwardly over the lower end of the extension, which they are enabled to do directly because of the fact that the cutters, on their inside faces, are provided with a recess for the accommodation of the enlarged lower end of the body, and they are further so enabled to collapse because they hang free upon a spring actuated device in the interior of the reamer. But they are suspended—not by means of a key-seat in a recess in the shank of a cutter larger than the key, as in the patent in suit, but the upper end of the cutter shank is formed into an inner shoulder hooked over an exterior shoulder upon a spring actuated box open at the lower end, allowing it to travel downward with the cutters, over an interposed portion of the body."

This unfortunate misstatement of the construction and operation of the Brown underreamer was made

by the lower Court to substantiate his conclusion that these differences in operation are sufficient to avoid anticipation.

It is incontrovertible that a proper understanding of this Brown patent will prove it to cover claims 2, 6, 7, and 8 in the Double patent, and in comparing them no such a broad range of equivalents need be applied as the lower Court has used in comparing the Double patent with the Wilson reamer. Here is "the same effect * * * produced by substantially the same mode of operation" as contemplated in 5 *Bann. & A.*, 4, previously cited. In the three claims in the Brown patent the several parts of the combination have been designated and described by slightly different terms from those used in the Double claims, but the parts themselves, their modes of operation and the results they accomplish are substantially identical.

"In determining the question of infringement, the court or jury, as the case may be, are not to judge about similarities or differences by the names of things, but are to look at the machines or their several devices as elements in the light of what they do or what office or function they perform, and how they perform it and to find that one thing is substantially the same as another if it performs substantially the same function in substantially the same way as to obtain the result." *Machine Co. vs. Murphy*, 97 U. S. 120.

The same words are used in *Bates vs. Coe*, 98 U. S. 31, and this case has been freely used in the opposing counsel's brief before the lower Court:

“Devices in one machine may be called by the same name as those contained in another, and yet they may be quite unlike, in the sense of the patent law, in a case where those in one of the machines perform different functions from those in the other. In determining about similarities and differences, courts of justice are not governed merely by the names of things, but they look at the machines and their devices in the light of what they do or what office or function they perform, and how they perform it, and find that a thing is substantially the same as another, if it performs substantially the same function or office in substantially the same way to obtain substantially the same result; and that devices are substantially different when they perform different duties in a substantially different way, or produce substantially a different result. *Ca-hoon vs. Ring*, 1 Cliff, 620.”

It is perfectly plain that the Commission of Patents rejected the original form of the Double Claim No. 7—originally numbered 8—because it was an exact description of the Brown Patent, let alone the O'Donnell Willard reamer for which application was co-pending. It read as follows:

“In an under-reamer the combination of a hollow mandrel, a slip-carrying rod in said mandrel, slips connected to said rod, and means for tilting said slips.”

As allowed, it reads:

“In an under-reamer, the combination with a hollow mandrel, provided with a slotted extension, a spring-actuated slip operating rod provided with a pivot key, tilt slips provided with key-seats adapted to be engaged by said pivot key, said key-seats being somewhat larger than

the key to allow the slips to tilt, said slips provided with inwardly projecting shoulders, and said slotted extension provided with surfaces adapted to tilt said slips and hold the same in expanded position.”

The only reason which can possibly be advanced to justify the granting of this Claim 7 in its amended form, by the Commissioner of Patents, is that, in the opinion of the Commissioner, the detailed description in the amended claim narrowed the Double combination sufficiently to prevent its including the Brown combination and (let alone the O'Donnell & Willard combination) and confines the Double device to a combination containing the key slot (7) in the extension (6) and a removable key (17) in the spring-actuated device. The same reasoning demands that, in order to infringe the Double combination, the key slot in the downward extension and the removable key must be present in the infringing combination, and the Double claims must be construed strictly in this regard.

As to this voluntary limitation by an applicant in amending his claims, the Circuit Court of Appeals of this Circuit has said in *Marshall & Stearns Co. et al. vs. Murphy Manufacturing Co. et al.*, 199 Fed. at page 776:

“It is claimed that by reason of such abandonment there is in law no anticipation of Jordan's combination and that, therefore, he is entitled to the liberal construction of his patent which would be applicable if his original claims had been allowed. This proposition can not be

sustained. Acquiescing in the rulings of the officers of the Patent Office, Jordan, in order to obtain his patent, limited his claims, and it can make no difference with the result that the interfering application was withdrawn or abandoned. The limitations so imposed can not be disregarded.” (Citing *Lapham-Dodge Co. vs. Severin*, 40 Fed. 763; *Plecker vs. Poorman*, 147 Fed. 530; *American Stove Co. vs. Cleveland Foundry Co.*, 158 Fed. 978, 86 C. C. A. 182; *Johnson Furnace & Engineering Co. vs. Western Furnace Co.*, 178 Fed. 819, 102 C. C. A. 267; *Morgan Envelope Co. vs. Albany Perforated Wrapping Paper Co.*, 152 U. S. 425 and others.)

“In the case last cited, Mr. Justice Brown said: ‘but the patentee having once presented his claim in that form, and the Patent Office having rejected it, and he having acquiesced in such rejection, he is, under the repeated decisions of this court, now estopped to claim the benefit of his rejected claim, or such a construction of his present claim as would be equivalent thereto.’ ”

This decision was rendered in this Circuit by the Court of Appeals in 1912 and is a leading controlling decision in this Circuit.

In *O’Brien-Worthen Co. vs. Stempel*, 209 Fed. 847, syllabus by the Court, being the decision of Judge Sanborn of the Circuit Court of Appeals, Eighth Circuit, rendered December 11, 1913, it was held as follows:

“The patentee in letters patent No. 688,446, who described and claimed in his original petition for a patent on improvements in gum plasters, an elastic medicated suction cup, a suction cup adapted to contain a medicament in the form

of a pasty composition, a medicated piece of raw cotton and in any other form, and a rubber suction cup combined with an absorbent material for holding and retaining the medicament and who acquiesced in the rejection of all these claims on Rosell's patent, No. 624,545, and Kusnik's patent, No. 647,003, amended his petition and accepted a claim for an elastic cup to whose inner surface an absorbent lining for holding and retaining a medicament is securely fixed, is estopped from maintaining that this claim is infringed by the manufacture and sale of an elastic cup to whose inner surface a pasty composition consisting of dextrine, water, and the medicament oleoresin of capsicum, is applied and permitted to dry into a solid adhesive lining before its sale or use."

"If a patentee acquiesces in the rejection of his claims on references cited in the Patent Office and accepts a patent on an amended or substituted claim, he is thereby estopped from maintaining that the amended or substituted claim covers the devices or combinations shown in the references, and from successfully claiming that it has the breath of the claims that were rejected, but he is not estopped from claiming and securing by his amended claim every known and useful improvement which he has invented and which is not disclosed by the references."

Likewise in *Campbell vs. American Ship Building Co.*, 179 Fed. 498, decided by the Circuit Court of Appeals of the Sixth Circuit April 5, 1910, it was held that where an applicant for a patent acquiesces in the rejection of claims presented, and amends the same or substitutes others to meet the objections of the Patent Office, he must be deemed to have surrendered and disclaimed what he thus conceded, and

is bound by the limitations so imposed, and it is immaterial whether the Office was right or wrong in rejecting the original claims. After discussing the successive limitations through which a limited claim was finally substituted for the claims of broad import previously presented, the Court says on page 501:

“Thereupon, February 5, 1901, Campbell instructed the Commissioner to amend the new claim by erasing the word ‘parallel’ and inserting after the words ‘side walls’ the words ‘parallel throughout their entire length.’ On February 14, 1901, the claim as thus amended was rejected on reference to the Shone patent in connection with Jones patent, No. 221,412 of November 11, 1879. On March 16, 1901, Campbell again amended the claim by directing the insertion, immediately after the amendment of February 5th, of the words ‘and unobstructed from bottom to top.’ The claim was thereupon allowed by the Commissioner, and as so finally amended is as follows:

‘A cargo vessel having the double sides and bottom, and a central longitudinal trunk or hold unobstructed from front to rear, and having vertical side walls parallel throughout their entire length and unobstructed from bottom to top, substantially as and for the purpose set forth.’

What, then, is the true significance of the amendments? What, if any, limitations and restrictions do they impose? The rejection of the original claims was based upon the Shone patent, as before stated. That patent provides for a ship with an outer and inner hull, with intervening space in which either water or freight may be carried. The regular cargo hold is within the inner hull, with vertical sides, and with a number of cross bulkheads. This hold is given the shape of the bow as it approaches that por-

tion of the vessel; in other words, it has not parallel sides throughout its length. This was met by the first amendment of the specification, which provided for continuous vertical and parallel side walls. The second amendment of the specification discloses two distinct features. One is that the unloading device 'can pass up the vertical side walls of the hold without meeting any overhanging obstruction.' The other is 'that, the side walls of the hold being parallel throughout their length, the hatchway coamings may be utilized as rails for a traveling discharging apparatus, or rails may be secured to the deck beside these coamings, so that the apparatus may travel without interruption from end to end of the cargo space.'

Two amendments of the new claim, were, however, exacted and made before the examiner appears to have been satisfied that it was in correspondence with the features just pointed out. The first amendment of the new claim required that the side walls of the cargo hold should be vertical and parallel, not merely part of their length, but 'throughout their entire length,' and the second one required that the side walls should be 'unobstructed from bottom to top.' When these amendments are read in connection with the first amended claim, it will be seen in the first place that the shape of the new hold is defined with exceptional clearness and imperative exaction. It must be a 'central longitudinal trunk' extending 'from front to rear,' with 'vertical side walls parallel throughout their entire length.' In the next place, freedom from obstruction is made equally peremptory. The hold shall be 'unobstructed from front to rear,' and the side walls shall be 'unobstructed from bottom to top.' Since the mere form of a thing patented can be made of its essence, it will be difficult to conceive of language more clear and distinct, or

more calculated than this is to accomplish such a purpose. *Wener vs. King*, 96 U. S. 218, 230; 24 L. Ed. 613.

These latter requirements, like the others, were based on references to specified patents. These, in the judgment of the examiner, like the Shone patent in the first instance, were sufficient to warrant his rejections, and the effect was to induce Campbell to meet them with satisfactory amendments. It is not necessary to examine those patents with any purpose either of defining the prior art or of otherwise justifying the action of the Patent Office. It is sufficient that Campbell acquiesced in the rulings, instead of taking the prescribed course of appeal."

By cancelling claim 8 inserted by amendment and substituting narrow claim 7, as shown in file Wrapper and Contents of the Double patent in evidence in this case, Double acquiesced in the ruling of the Patent Office rejecting this broader claim 8, instead of taking the prescribed course of appeal. It is not necessary to examine the patents upon which this claim was rejected for the purpose of justifying the action of the Patent Office. It is sufficient that Double acquiesced in the rulings and cancelled this claim. Having done so he dedicated to the public the substance of that claim, and that claim 8 so cancelled was the only claim ever presented in this case of sufficient scope to even by implication dominate Defendant's device. Complainants cannot claim to have a monopoly for the mechanical territory between this cancelled claim 8 and the limited claim 7 substituted therefor, or the other limited claims of

the patent in suit. Double cannot now be heard to ask, in effect, to reinstate such cancelled claim 8. He is bound by his voluntary cancellation of it, and his patent monopoly is correspondingly cut down and attenuated to the very specific groups or combinations of elements covered in the claims of the patent. This estoppel of Complainants is an actual bar to this suit when the device of the Double patent is compared with the device of Defendant or of the Wilson patent. This will follow from the numerous decisions throughout this brief pertinent to proper interpretation of the Double patent.

In *Safety Oiler Co. vs. Scoville* (C. C.), 110 Fed. 203, 205, Judge Coxe said:

‘The contention that the patentee was not called upon by anything in the prior art to limit the claim as stated is wholly immaterial, where here is no escape from the conclusion that he has so limited it. The law in such circumstances is too plain to admit of doubt.’

In *Brill vs. St. Louis Car Co.* (C. C. A., 8th Cir.), 90 Fed. 666, 668, 33 C. C. A. 213, 215, Judge Thayer said:

‘It is immaterial, we think, whether the Patent Office was right or wrong in rejecting the complainant’s original claims on the ground that the invention therein described was anticipated by the prior art. By amending his specification and claims, the complainant admitted, in effect, that some limitations were necessary; and it is now too late to assert that he was entitled to his original claims or that the claims as finally allowed are as broad as the original claims.’

In *American Stove Co. vs. Cleveland Foundry Co.* (C. C. A., 6 Cir.), 158 Fed. 978, 983, 86 C. C. A. 182, 187, Judge Severens said:

‘The applicant had a long struggle in securing his patent, and was constrained to trim away, modify and otherwise define his specifications and claims to meet the references made by the office until they were brought within very narrow limits before his patent would be allowed. He must be deemed to have surrendered and disclaimed what he conceded, and to have imposed such definition upon the language of the patent as he attributed to it in order to secure the grant.’

In *Morgan Envelope Co. vs. Albany Paper Co.*, 152 U. S. 425, 429, 14 Sup. Ct. 627, 629, 38 L. Ed. 500, Mr. Justice Brown stated the rule thus:

‘It is insisted in this connection, however, that under the words ‘substantially as described’ the patentee is entitled to claim a band of oval or oblong shape, and that, looking at his specification and drawing in connection with the claim, it is obvious that the latter should be so limited. But the patentee having once presented his claim in that form, and the Patent Office having rejected it, and he having acquiesced in such rejection, he is, under the repeated decisions of this court, now estopped to claim the benefit of his rejected claim, or such a construction of his present claim as would be equivalent thereto.’

See, also, *American Graphophone Co. vs. Universal Talking Mfg. Co.*, 151 Fed. 595, 605, 81 C. C. A. 139:

‘It inevitably follows that the language into which the grant of the present patent was ulti-

mately resolved must be interpreted with constant reference to the limitations and restrictions imposed, and with respect to the matters distinctly excluded through rejection and amendment. As said by Justice Blatchford (if, indeed, further citations were necessary), in *Roemer vs. Peddie*, 132 U. S. 313, 317, 10 Sup. Ct. 98, 99, 33 L. Ed. 382:

‘This court has often held that when a patentee, on the rejection of his application, inserts in his specification, in consequence, limitations and restrictions for the purpose of obtaining his patent, he can not, after he has obtained it, claim that it shall be construed as it would have been construed if such limitations and restrictions were not contained in it.’

Again, in *Shepard vs. Carrigan*, 116 U. S. 593, 597, 6 Sup. Ct. 493, 495, 29 L. Ed. 723, it was said:

‘Where an applicant for a patent to cover a new combination is compelled by the rejection of his application by the Patent Office to narrow his claim by the introduction of a new element, he can not after the issue of the patent broaden his claim by dropping the element which he was compelled to include in order to secure his patent.’

We may now consider the question of infringement. Defendant, as its name indicates, is a ship building company. The type of boats constructed by that company, which are said to infringe the patent in suit, are in many respects similar to the boat described in the Campbell patent. We understand it to be conceded that no vessel has ever been constructed according to the Campbell patent, and we must therefore refer to the Letters Patent for purposes of comparison. Apart from some obsolete boats of defendant, which do not seem to be in controversy,

none of defendant's boats has a cargo hold with 'vertical side walls parallel throughout their entire length.' The holds of all the boats in dispute converge toward the bows. If nothing else were said, it is plain that the hatchway coamings could not 'be utilized as rails for a traveling discharging apparatus,' nor could rails 'be secured to the deck beside these coamings,' so that the apparatus might 'travel without interruption from end to end of the cargo space.'

This would be equally true, if, as claimed, the engine were placed amidship (assuming this to be still allowable) and two longitudinal trunks or hoppers were maintained; for surely each of two holds, no less than one hold, would have to conform to the requirement mentioned, and yet the portion of the hold converging at the bow would quite as clearly prevent the use aforesaid of the coamings or adjacent rails as the same portion would if a single hold were provided and the engines were placed, as it is stated they preferably should be, either forward or aft of the cargo hold. It cannot be rightfully said that the plan described for carrying the discharging apparatus along the coamings or adjacent rails is unimportant, because it will be recalled that this feature was definitely described in the first amendment made. Furthermore, the first amended claim specified 'a central longitudinal trunk or hold unobstructed from front to rear.' It is true, as before shown, that in rejecting the first amended claim the examiner in substance stated that the Corey patent shows a central longitudinal hold unobstructed from front to rear, having vertical side walls, and that to make these continuous as shown by Shone would not involve a matter of invention; but, in view of the fact that this form of unobstructed trunk was retained in the claim after it was further so amended as to satisfy the examiner, it can

hardly be said that such a trunk was not an essential element of the Campbell combination as finally amended.

This amended provision was for one hold, not for two or more holds. It might therefore be hard to reconcile it with the old provision allowing the engines to be placed amidships. But still assuming that right construction might, despite the contradiction, admit of two holds, one forward and one aft of the engines, there is another feature of all of defendant's boats, except the Wolvin, which we think must differentiate them from Campbell's amended design. Those boats all have transverse vertical bulkheads, dividing the holds into a number of cargo compartments. It would be manifestly impracticable to operate any discharging apparatus along the coamings or adjacent rails with such bulkheads interfering at frequent intervals. It is said, however, that the clam-shell grabber could be used to unload the vessels; but that device could be employed for the same purpose respecting a single hold, as well as a plurality of holds. Besides, the contention ignores the obvious purpose of inserting the requirement, at the time the amendment was made, concerning the use of a discharging apparatus to be carried along the coamings or adjacent rails. The insistence of counsel concedes that bulkheads might have been used under the original and rejected claims; but it ignores the fact that one of the reasons for the first rejection must have been that the Shone patent provides for compartment bulkheads, and so anticipated Campbell's original application in this very particular. As pointed out in some of the decisions before cited, Campbell could not, in order to secure his patent, surrender the right to maintain bulkheads and cargo compartments, only

to lay claim to the same right after the patent was issued.

But there is another distinction between defendant's boats and the Campbell design that must be noticed. It is found in the last amendment. It will be remembered that one of the amendments required the side walls of the hold to be vertical and parallel throughout their entire length, and that the exaction of the last amendment was that they should also be 'unobstructed from bottom to top.' This was made necessary, in the opinion of the examiner, by reason of a prior patent. When this provision is considered, in connection with the other provisions of the claim as amended finally, it clearly discloses a purpose to have the hold unscreened and open at the top, certainly when being unloaded. This would be necessary, as shown, also, in the opening paragraph of the original specification before quoted, when operating the discharging apparatus along the coaming or adjacent rails.

Above all, an open trunk is made necessary by the amendment which reads:

'From this construction it results that in unloading the cargo the discharging bucket or other apparatus can pass up the vertical side walls of the hold without meeting any overhanging obstruction, so that any cargo lying close against these side walls can be readily got at.'

Now, all of defendant's boats, including the Wolvin, have what is called an 'overhang' extending along each side of the cargo hold. It is testified without apparent contradiction that part of the cargo in the trunk lies underneath this overhang; also that a discharging bucket or other apparatus would not pass up the side walls of the hold without encountering this overhanging construction. Moreover, all of defend-

ant's boats have at frequent intervals deck or tie beams, which form part of the permanent construction and extend across the holds from side to side to strengthen the vessels. Clearly the holds of such vessels could not be converted into open troughs like those described in the Campbell design. Even though the removable hatch tie-beams of the latter design were intended to be and still could be permanently fastened to the sides of the holds, no continuous overhang like that in each of defendant's boats would be present. But enough has been said to differentiate defendant's boats from the Campbell design, unless it be the Wolvin.

The design of the Wolvin is in all respects like that of the rest of defendant's boats, with these exceptions: While its plan contemplated eight bulkheads, only six were originally put in place, and none of these were compartment bulkheads. Two of defendant's witnesses testified that bulkheads were built into the cargo hold later; but the date, if not the fact, of doing this is disputed. We think, however, the preponderance of evidence shows that they have since been put in place; and since the Wolvin possesses other features of difference we regard the temporary omission of the bulkheads as unimportant. The only other difference is that the walls of the Wolvin's cargo hold are not vertical. The hold is narrower at its floor than it is at its top. A projection extends along each side of the hold from the floor for some distance upward, where it slopes outwardly to the sides and widest portion of the hold.

It is earnestly insisted that the fact that the side walls of the Wolvin are not vertical is of no importance. Ordinarily this would be true, as in principle laid down in one of the cases relied on by plaintiff's counsel. *Winans vs. Denmead*, 15 How. 330, 14 L. Ed. 717. No rejection or amend-

ment, however, was made of the application in that case, and consequently no restriction imposed in that way upon the language of the patent had to be considered. But, in view of the other differences between the Wolvin and Campbell's design, we need not pass upon the one relating to the side walls of the cargo hold. Indeed, careful consideration both of the facts and the law constrains us to hold that the history of this application in the Patent Office requires the invention to be limited to the design described in the patent, and that, yielding to its validity for the purposes of this decision, there is no infringement.

The decree below must be affirmed, with costs."

This decision fully discusses this doctrine of estoppel of the patentee to claim anything broader than the claims as voluntarily formulated and limited by him in the prosecution of the application for the patent, and was one of the authorities cited by Judge Gilbert of the Circuit Court of Appeals of this Circuit in *Marshall & Stearns Co. et al, vs. Murphy Manufacturing Co. et al, supra*.

The decision of Justice Blatchford of the Supreme Court in *Roemer vs. Peddie*, 132 U. S. 313-317, is seen among the citations in addition to 152 U. S. 425, cited in *Marshall & Stearns Co. et al, vs. Murphy Manufacturing Co. et al, supra*.

See also *Condit Electrical Manufacturing Co. vs. Westinghouse Electric & Manufacturing Co.*, 200 Fed. 144, a decision of the Circuit Court of Appeals

for the first Circuit, rendered November 6, 1912, in which it was held at page 147:

“It is well settled that a patentee, having acquiesced in the rejection of a claim, is estopped to claim the benefit of his rejected claim, or such a construction of his present claims as would be equivalent thereto.” (*Morgan Envelope Co. vs. Albany Perforated Paper Co.*, 152 U. S. 425, cited in *Marshall & Stearns Co. et al. vs. Murphy Manufacturing Co. et al.*, *supra*).

Also in *Automatic Switch Co. vs. Monitor Manufacturing Co. et al.*, 180 Fed. 983, is was said on page 989:

“Should this claim be so understood? It is possible to put such a construction upon its words provided the Patent Office history of the patent is ignored. Even, then, the meaning which the complainant would give to the claims is not the obvious or more natural import of its language. But the Patent Office file wrapper has been put in evidence. It shows that the original application for this patent contained a claim numbered 2 * * * it was rejected by the Patent Office examiner. He said it was too broad in view of Cook 597,265 * * * Herdman, 603,849 * * *. Each of these patents shows a switch in which the armature circuit remained closed when the supply circuit contact blades had been moved to the stop position. The patentee then cancelled the original claim No. 2, and substituted therefor the following: * * *. This amended claim was also rejected, as fully anticipated by Shepard & Herdman. The patentee then cancelled the amended claim No. 2, and gave up the effort to get a claim which would cover a switch in which the supply circuit contact blades were not required to move

past the stop position. In the defendant's devices alleged to infringe the supply circuit contact blades do not move past the stop position * * *. But, in spite of this fact, I do not think the complainant can now be heard to say that the first claim of the patent in suit is infringed by any device in which the contact blades do not move past the stop position. In so saying it is in effect asking that claim No. 1 shall now be given a meaning as broad as the original claim No. 2. This the law will not permit. A patentee who has originally sought broader claims which were rejected and who has acquiesced in such rejection can not under the authorities be allowed to insist upon such a construction of the allowed claims as would cover what had been previously rejected." (Citing *Roemer vs. Peddie*, 132 U. S. 317, *supra*.) I am therefore of opinion that the defendants do not infringe claim 1 of patent 716,504."

It will be seen that this clearly and repeatedly enunciated law with accuracy sets the circumstances of the present case. The invention was never claimed by Double in any broad aspects, and even the limited form in which the claims were originally presented had to be made still more limited in order to point the extremely minute features of improvement introduced within the art by the alleged inventor. In 179 Fed. at page 501, *supra*, we find at the top of this page that the inventor instructed the Commissioner of Patents to amend the new claim by erasing the word "parallel" and inserting after the words "side walls" the words "parallel throughout their entire length." And that the claim even then was rejected and a further amendment was made by inserting

other restricting language. This is the procedure that Double or his attorneys took. He voluntarily inserted language which in its plain import restricts his patent to a narrow territory outside of which Defendant's entire structure falls.

A further leading authority on this point is that of *Westinghouse vs. Boyden*, 170 U. S. 568, the doctrine of which case stands today and makes it impossible that Double or his attorney ever intended to claim and likewise that this Court could find that the Double patent does cover and claim anything further than the very specific structural parts named and specified in the claims relied upon in this suit. As one Court has said, the patentee has open to his use for the selection of terms definitive of his invention all of the pages of the dictionary, and if he elects to define his invention in terms specific of certain particular parts, no charitable interpretation of the doctrine of equivalents can be employed to make over the claim into some different intent and meaning. The law never contemplated that it is necessary for a manufacturer to consult anything but a given patent to determine whether it is so drawn as to cause his possible prospective acts to infringe such patent. While the appellee will contend that more or less extensive adoption of the Double under-reamer tends to establish the invention as of importance, it was not incumbent upon appellant to consider such adoption in addition to the very terms of the Double patent claims themselves. The rejected claim 8 of the Double application used broad lan-

guage regarding the tilt of the cutters. This was inclusive language, but it was stricken out and the most specific language substituted. No attempt was made to halt half-way. The patentee went from Zenith to Nadir and cannot rise to a higher level of monopolistic value of the claim. Clearly appellant does not use what the Double claims call for. Further important authorities of the U. S. Supreme Court we quote on this point as follows:

As patents are procured *ex parte*, the public is not bound by them, but the patentees are. If the office refuses to allow him all he asks, he has an appeal. But the courts have no right to enlarge a patent beyond the scope of its claim as allowed by the Patent Office, or the appellate tribunal to which contested applications are referred. When the terms of a claim in a patent are clear and distinct, as they always should be, in a suit brought upon the patent, the patentee is bound by it.—*Keystone vs. Phoenix*, 95 U. S. 274; 24 L. Ed. 344.

Merrill vs. Yeomans, 94 U. S. 568.

In this case the description of appellee's invention is much broader than his claim. It seems quite clear, from the present form of appellee's specifications, and from the fact that his application for a patent was twice rejected, that he was compelled by the Patent Office to narrow his claim to its present limits before the commissioner would grant him a patent. In doing this he neglected to amend the descriptive part of his specifications. He cannot go beyond what he has claimed and insist that his patent covers something not claimed, merely because it is to be found in the descriptive part of the specifi-

cations.—*Lehigh vs. Mellon*, 104 U. S. 112; 26 L. Ed. 639.

Burns vs. Meyer, 100 U. S. 671; *Keystone vs. Phoenix*, 95 U. S. 278.

In patents for combination of mechanism, limitations and provisos, imposed by the inventor, especially such as were introduced into an application after it had been persistently rejected, must be strictly construed against the inventor, and in favor of the public, and looked upon as in the nature of disclaimers.—*Sargent vs. Hall*, 114 U. S. 63; 29 L. Ed. 67; 5 S. Ct. 1021.

Fay vs. Cordesman, 109 U. S. 408;
Water Meter vs. Desper, 101 U. S. 332;
Gage vs. Herring, 107 U. S. 640.

If an applicant, in order to get his patent, accepts one with a narrower claim than that contained in his original application, he is bound by it.—*Shepard vs. Carrigan*, 116 U. S. 593; 29 L. Ed. 723; 6 S. Ct. 493.

Where an applicant for a patent to cover a new combination is compelled by the rejection of his application by the Patent Office to narrow his claim by the introduction of a new element, he cannot after the issue of the patent broaden his claim by dropping the element which he was compelled to include in order to secure his patent.—*Shepard vs. Carrigan*, 116 U. S. 593; 29 L. Ed. 723; 6 S. Ct. 493.

Leggett vs. Avery, 101 U. S. 256;
Goodyear vs. Davis, 102 U. S. 222;
Fay vs. Cordesman, 109 U. S. 408;
Mahn vs. Harwood, 112 U. S. 354;
Cartridge vs. Cartridge, 112 U. S. 624;
Sargent vs. Hall, 114 U. S. 63.

Complainant is not at liberty now to insist upon a construction of his patent which will in-

clude what he was expressly required to abandon and disavow as a condition of the grant.—*Sutter vs. Robinson*, 119 U. S. 530; 30 L. Ed. 492; 7 S. Ct. 376.

Shepard vs. Carrigan, 116 U. S. 593, and cases there cited.

As the claim must be held to define what the Patent Office had determined to be the patentee's invention, it ought not to be enlarged beyond the prior interpretation of its terms.—*Day vs. Fair Haven*, 132 U. S. 98; 33 L. Ed. 265; 10 S. Ct. 11.

When applicant has limited his claim by including specific elements in his combination under rejection by the Patent Office he is limited thereby to his specific elements.—*Phoenix vs. Spiegel*, 133 U. S. 360; 33 L. Ed. 663; 10 S. Ct. 409.

Roemer vs. Peddie, 132 U. S. 313, and cases there cited.

A claim admitted by the Patent Office and acquiesced in by the patentee should not be enlarged by construction beyond the fair interpretation of its terms.—*Haines vs. McLaughlin*, 135 U. S. 584; 22 L. Ed. 241; 10 S. Ct. 876.

Must be read and interpreted with reference to the rejected claims and to the prior state of the art and cannot be construed to cover either.—*Knapp vs. Morss*, 150 U. S. 221; 37 L. Ed. 1059; 14 S. Ct. 81.

Shepard vs. Carrigan, 116 U. S. 593; *Sutter vs. Robinson*, 119 U. S. 530.

Where applicant has amended on rejection by Patent Office he is estopped to claim the scope of original claim.—*Morgan vs. Albany*, 152 U. S. 425; 38 L. Ed. 500; 14 S. Ct. 627.

Acquiescence in the rejection of a claim and restriction by amendment limits the construction of the claim to the device shown.—*Lehigh vs. Kearney*, 158 U. S. 461; 39 L. Ed. 1055; 15 S. Ct. 871.

Knapp vs. Morss, 150 U. S. 221.

His acquiescence in the rulings of the Patent Office indicates very clearly that he should be limited to the combination claimed, and that the case is not one calling for a liberal construction.—*McCarty vs. Lehigh*, 160 U. S. 110; 40 L. Ed. 358; 16 S. Ct. 240.

Whether the examiners were right or wrong in so holding (narrowly limiting the claim) we are not to inquire, as the claimant did not appeal, but amended his claim and accepted a grant thereof, thereby putting himself within the range of the authorities which hold that if the claim to a combination be restricted to specified elements, all must be regarded as material, and the limitations imposed by the inventor, especially such as were introduced into an application after it had been persistently rejected, must be strictly construed against the inventor and in favor of the public, and looked upon as in the nature of disclaimers.—*Hubbell vs. U. S.*, 179; U. S. 77; 45 L. Ed. 95; 21 S. Ct. 24.

Union vs. Desper, 101 U. S. 332; *Morgan vs. Albany*, 152 U. S. 425.

In order to get his patent, he was compelled to accept one with a narrower claim than that contained in his original application; and it is well settled that the claim as allowed must be read and interpreted with reference to the rejected claim and the prior state of the art, and cannot be so construed as to cover either what

was rejected by the Patent Office or disclosed by prior devices.—*Hubbell vs. U. S.*, 179 U. S. 77; 45 L. Ed. 95; 21 S. Ct. 24.

Leggett vs. Avery, 101 U. S. 256; *Shepard vs. Carrigan*, 116 U. S. 593; *Knapp vs. Morss*, 150 U. S. 227.

In view of what passed in the Patent Office, and the state of art, we cannot regard the Kitselman patent as a pioneer patent, but think its claims must be limited in their scope to the actual combination of essential parts as shown and cannot be construed to cover other combinations of elements of different construction and arrangement.—*Kokomo vs. Kitselman*, 189 U. S. 8; 47 L. Ed. 689; 23 S. Ct. 521.

Where an inventor seeking a broad claim, which is rejected, in which rejection he acquiesces, substitutes therefor a narrower claim, he cannot be heard to insist that the construction of the claim allowed shall cover that which has been previously rejected.—*Computing vs. Automatic*, 204 U. S. 609; 51 L. Ed. 645; 27 S. Ct. 307.

Corbin vs. Eagle, 150 U. S. 38;
Hubbell vs. U. S., 179 U. S. 77;
Leggett vs. Avery, 101 U. S. 256;
Shepard vs. Carrigan, 116 U. S. 593;
Knapp vs. Morss, 150 U. S. 221.

In connection with this discussion of the Brown patent the Court's attention is called to the testimony of Double corroborated by the certified abstract of title pertinent to the Double patent taken from the records of the Patent Office, that the owners of the Double patent bartered one-half of such patent for one-half of the Brown patent. This emphasizes the importance they attached to the Brown

patent and invention by raising the presumption that they were protecting themselves as against probable infringement of the Brown patent. Even Double admits that the owners of the Brown patent were threatening his company with suit for infringement at the time.

While the Double reamer, as we have seen, followed closely the Brown patent, *no such similarity exists as between the Double combination and the Wilson underreamer, as the latter does not have the downward extension (6), with its slot or key-way (7), nor the removable key in the spring-actuated tee-rod or "cross" shown in Figure 11 in the Wilson patent drawings. These elements of the Double combination are absent from the Wilson device and there is nothing in the Wilson combination that can be construed as their equivalents under the most liberal application of the doctrine of equivalents, if the patent were entitled to any such liberality.*

"‘An infringement,’ says Justice Grier in *Burr vs. Duryee*, 1 Wall. 532, 572, ‘involves substantial identity,’ whether that identity be described by the terms ‘same principle,’ same ‘modus operandi,’ or any other * * *. The argument used to show infringement assumes that every combination of devices in a machine which is used to produce the same effect, is necessarily an equivalent for any other combination used for the same purpose * * * *This is a flagrant abuse of the term ‘Equivalent.’*” *Westinghouse vs. Boyden Power Brake Co.*, 170 U. S. 568.

On the other hand, every feature of this tilting action in the Double reamer is to be found in the

Brown device. A close study of these underreamers will show that at the instant of collapsing of the cutters over the lower end of the downward extension, they “tilt” or “teeter” upon the “opposite parallel bearing faces” of the “downward extension” as a fulcrum. This tilting, as Double testifies, is permitted by the upper ends of the cutters moving outward as the lower ends collapse together, this action causing a sliding movement of the cutters upon the suspending key. Great emphasis has been placed upon this “tilting action” by the opposing counsel and the lower Court, and their arguments leave no room for doubt that this “tilting action” *is to be regarded as the distinguishing feature of the mode of operation of the Double underreamer*. The appellee rested his case on this point and the lower Court decided the case in his favor on this point, and this notwithstanding this feature was appropriated bodily from the Brown as well as the Jones reamer, and particularly the O’Donnel & Willard reamer patents.

The Appellant’s strongest answer to this argument is that *no such mode of operation is to be found in the Wilson underreamer* for the reason that in its collapsed position there is no portion of the mandrel interposed between the cutters to serve as a fulcrum for any “tilting” or “teetering” motion. The cutters of the Wilson underreamer do not “tilt” or “teeter” in the sense that the Double, Brown, Jones and O’Donnell & Willard and many others do. The cutters of the Wilson device, when collapsing, swing

pendulum-like together and pivot on the point of suspension, which is the integral "Tee" or "Cross" at the bottom of the spring-actuated rod. The upper ends of the shanks of the cutters are in precisely the same position with the cutters collapsed as when they are in the open or reaming position. *The Wilson cutters swing between the prongs or forks of the mandrel instead of tilting over a downward extension of the mandrel.* This mode of operation is original with Wilson and is covered by basic claims in his patent No. 827,595. We submit that the Appellee has failed to show that this mode of operation is substantially the same as that of the Double device or its predecessors, the Brown, O'Donnell & Willard, Jones and others which have been exhibited in this case, and *the burden of proof was upon the Appellee to do so.*

It is plain that the lower Court failed completely to understand this so-called "tilting" action, which he discussed in detail, and this was doubtless due to the confusion with which the Appellee succeeded in surrounding this important point.

That Double himself clearly understood the difference between the tilting action of the cutters and the suspending of the cutters for tilting action, as in the Double patent, and the pendulum action of the cutters as in the Wilson reamer and the Canadian reamer, is manifest from the following testimony of Double:

R. p. —, as follows:

“I don’t know whether the Canadian reamer cutters tilt or swing, according to their drawing. From the cut I cannot tell whether the cutters would tilt or swing. Looks as though these cutters would swing instead of tilt. It looks as if the pin going through that central bar went through both cutters.

XQ. 271. In other words, you would make it out that that pin was a fixed center for the cutters to swing on; is that it?

A. Yes, like a pair of scissors would be pivoted.

XQ. 272. Then the difference between that and tilting concerns the moving or sliding of the cutters on a key?

A. Yes.

XQ. 273. Is that it?

A. Yes.

The opposing counsel contends that the “tilting” action of the Double cutters is due to an important difference between the Double underreamer and all former underreamers, and says that this difference is to be found in the position of the slip shoulders which contact with the casing shoe to cause the slips to collapse. It is contended that in the Double underreamer these shoulders are located high up on the slips close to the key which acts as a fulcrum and that the location of these shoulders causes the sudden collapse of the cutters, or slips.

It is to be pointed out that, if this feature is important, it is strange that it should not have been the

subject of a claim in the Double patent. In this respect the Double device follows the principle of the Brown patent exactly, and also the Jones reamer. It can also be said, in order to elucidate this point still further, that the sudden collapse of the cutters in the Double and Brown underreamers is not due to the location of the shoulder on the cutter, as argued by opposing counsel, who does not seem to understand the operation of the Double device. This sudden collapse of the cutters in the Double underreamer is due to the fact that they do not collapse at all during their long downward movement when they are sliding upon the "opposite parallel bearing faces" of the "downward extension," except that slight collapse due to the outward travel of the upper ends of the cutters on the key. But when the "inward projections" of the slips pass off of these "opposite parallel bearing faces" the cutters collapse together instantly. This movement is identical with the collapsing of the cutters of the Brown underreamer and for the reason that it also has the "opposite parallel bearing faces" on its "downward extension" and "inward projections" on its cutters. See also the Yorke patent. The distance of the cutter shoulders below the fulcrum of the cutters has nothing to do with this movement whatever.

The Wilson underreamer does not have this mode of operation which causes the serious evil of "plunging" so detrimental to the operation of the Double and Brown underreamers. In the Wilson device the cutters begin to collapse the instant they contact with

the casing shoe and for the reason that the cutters bear against the prongs or forks on faces which “incline inwardly and downwardly” and not on “opposite parallel bearing faces.” The cutters of the Wilson underreamer collapse more rapidly at the lower end of their movement, but *they collapse from the beginning of the downward movement. To argue that these inclined bearing faces on the prongs or forks of the Wilson device are the equivalent of the “opposite parallel bearing faces” on the “downward extension” of the Double underreamer, when they eliminate such a grave evil as “plunging” is an abuse of the term “equivalent.”* See testimony Wilson, R. 160. Notwithstanding its simplicity this is an important feature of the Wilson underreamer and proves Wilson to be an inventor, and to have departed from what Double says is his invention, namely, opposite parallel bearing faces. Double put this imitation into his claim after the Patent Office cited the Swan patent, which has downwardly and inwardly-inclined opposite bearing faces. Double cannot prevent appellant from using what was old before Double.

We submit that the above considerations prove conclusively that the tilting means adopted for the collapse and expansion of the slips in the Double underreamer should have been included in the combination described by the lower Court as old in the art.

We are then left to the conclusion that all Double,

or his collaborator Jones, added to a previously-used combination was the then well known inter-related dovetails and that these are essential to the Double combination. This being the case how could the lower Court possibly find that claims 2, 6, 7 and 8 were infringed by the Wilson underreamer when these dovetails are not claimed, covered nor mentioned in any way in said claims? *The lower Court attempts to construe claim 1 of the Double patent so as to cover this combination of an element (the dovetails) and a mode of operation (the tilting action) but fails to show how claims 2, 6, 7 and 8 could be infringed by this hypothetical combination.*

The appellant strongly urged before the lower Court that the appellee is not entitled to a patent covering the combination of the dovetails with the means for securing the tilting action of the cutters in that the former is covered only by claim 1, and the latter by claims 6, 7 and 8. There being no claim in the Double patent covering both the dovetails and the means for securing the tilting action of the cutters. However, the lower Court justifies his decision that the appellee is entitled to a combination made up by grouping two or more claims of his patent, by the following remarkable statement:

“If defendant’s assumption were conceded, as long as the lesser combinations were covered by valid claims, no good reason appears—it being found that the entire combination is an invention of decided merit—for allowing only a narrow range of equivalents, although this course might be justified if each of the claims

was considered entirely independently of everything else than the prior art."

We confess that we are far from satisfied that we understand just what is meant in this involved sentence. It seems to say that the lower Court is privileged to group together the combinations of elements covered by individual claims to form a different and more embracing combination than is described in any single claim, if this new combination proves to have decided merit in operation. Also this feat is accomplished by some vague application of the doctrine of equivalents, and, if each of the claims in the Double patent were considered entirely independently of everything else than the prior art, the defendant (appellant) *might be justified in asking that the Double patent be limited to its claims*. In other words, if the prior art permits, the Court is at liberty to write and grant new claims. If our understanding of this sentence is correct we do not hesitate to say that this remarkable construction of the law is not supported by textbooks or decisions. We find that the authorities are unanimous in the opinion that a patent is limited to its claims and is no broader than its claims.

"The patentee was at liberty to describe his combination as he saw fit, having done so, the rights of the public are involved and the Court cannot construe the claims precisely as if all reference to the said printing surfaces were omitted." *Evans et al. vs. Hall Printing Press Co.*, 223 Fed. 539.

"The inventor can, of course, use any language he wishes in describing his invention and

in stating his claims. Having done so, however, he must abide by the phraseology chosen. It is then too late to reconstruct his claims by adding or subtracting from the language chosen. This rule may result in hardship in many cases but a contrary rule would work a far greater injustice *and would enable the patentee to hold as infringers those who have invested their capital in what they supposed, relying on the plain language of the patent, to be a perfectly legitimate business.* When the language of the claims of a patent is clear and distinct, the patentee is bound by it." *Keystone Bridge Co. vs. Phoenix Iron Co.*, 95 U. S. 274; 24 L. Ed. 334. *Merrill vs. Yeomans*, 94 U. S. 568; 24 L. Ed. 235.

"Some persons seem to suppose that a claim in a patent is like a nose of wax which may be turned and twisted in any direction, by merely referring to the specification, so as to make it include something more than, or something different from what its words express. The claim is a statutory requirement, prescribed for the very purpose of making the patentee define precisely what his invention is; and it is unjust to the public, as well as an invasion of the law, to construe it in a manner different from the plain import of its terms." *White vs. Dunbar*, 190 U. S. 51.

There can be no doubt that a patent is limited to the plain import of the terms of its claims and numerous other authorities could be cited if it were not presuming upon the time of this Court to do so. A study of the claims in the Double patent in suit will show that no single claim in that patent covers the combination of elements defined by the lower Court as comprising the Double device. *It is obvious*

the lower Court formed its opinion of the Double combination of elements from a study of the Double underreamer and not from an analysis of the claims of the Double patent.

Notwithstanding the remarkable conclusion of the lower Court which enabled him to combine two or more claims of the Double patent to include the combination of the tilting action of the cutters with the dovetail feature, he also states that:

“Claims numbered 1, 2 and 3, as originally proposed, were rejected by the Commissioner of Patents upon reference to the Swan patent and were only allowed upon their amendment and that of the specifications, the effect of the amendment being to make plain the tilting action of the cutters, or slips, *in addition to the inter-related dovetails and dovetail ways thereof upon the cutter shanks and body extension*, which latter were found in the Swan device. The effect of the amendment is made plain by an amendment required and made to the specifications and upon which the claims were allowed. This amendment is as follows:

“ ‘The sockets or key-seats (16) are somewhat larger than the key (17) to permit the slips (15) to partake of a tilting action, the key (17) thus forming a portion, on the rod (11), on which the tilt slips or bits (15) are loosely swung or pivoted, adapting their lower ends to tilt or swing in toward the center of the stock or mandrel portion to pass through the well-casing or to tilt away from the center to assume the proper position for reaming. The tilt-slips are provided with shoulders (18) adapted to slide upon a spreading portion provided in connection with the mandrel-body’.”

After much careful study of these amendments and claims we fail to see that this amendment makes plain in claims 2 and 3, (claim No. 3 is not included in this suit) the tilting action of the cutters *in addition to the inter-related dovetails and dovetail ways thereof upon the cutter shanks and body extension*. No reference whatever is made in claims 2 and 3 of the Double patent to the inter-related dovetails and dovetail ways any more than is made in claim 6. Claim 2 refers to "tilt-slips slidingly connected with the mandrel" but it is difficult to find a type of underreamer in which the cutters or slips are not slidingly connected with the mandrel. This description does not limit the combination to cutters with dovetails fitting into dovetail ways on the mandrel and, in the absence of such specific language, it certainly cannot be contended that this claim clearly describes the combination of elements which the lower Court has defined as comprising the Double invention.

The only claims in the Double patent which mention the dovetail feature are claims 1, 4 and 5. Claims 4 and 5 are not included in this suit and therefore will not be discussed. As to claim 1 the lower Court decides as follows:

"Defendant's contention in this particular (that no claim of the patent covers both the dovetail feature and the tilting action of the cutters) is based on a false premise. Claim 1 covers both the dovetail ways on the body, co-acting with the dovetails on the slips or cutters, *and means for the expansion and collapse of the*

cutters over the lower end of the extension. The following language of the claim covers the latter feature:

“‘Said slips being furnished with inward projections to slide *upon the downward extension of the mandrel* to spread apart the cutting edges of the slips when the slips are drawn up’.”

“*It is obvious that, if the cutters spread when drawn up, they would collapse on being drawn down.* That this claim not only covers the dovetail slips and ways, but such expansion and collapse of the cutters and the means for its accomplishment is further shown by the paragraph of the amended specifications above quoted, upon which amendment the Commissioner of Patents allowed claims 1, 2 and 3.”

Immediately preceding this quotation in the decision of the lower Court, the statement was made that when the cutters of the Brown patent were drawn up they would spread *but that they would not necessarily collapse when drawn down.* While this statement was incorrect, when applied to the Brown underreamer, as has previously been shown, we agree that it is not at all obvious that because the cutters of an underreamer spread when drawn upward they must necessarily collapse when drawn downward unless means are provided which cause such action. The above claim certainly does not describe any means of producing a “tilting action,” which the lower Court states was the invention of Double, and this “*claim is a statutory requirement, prescribed for the very purpose of making the patentee define precisely what his invention is; and it is unjust to the public, as well as an invasion of*

the law, to construe it in a manner different from the plain import of its terms." (*White vs. Dunbar*, 119 U. S. 51.)

Claim 1 does not cover, and no other claim covers, *both* the inter-related dovetails and the tilting means which the Court says was Double's invention. We have seen he did not invent it. Why *should* he claim it? It should not be insisted that he do so.

It is perfectly plain that, whoever drew up the claims of the Double patent, he did not have in mind the combination of elements described in the appellee's brief before the lower Court and which has been accepted by the lower Court as comprising the Double invention. It is plain that if Double had believed that "the chief novel feature of his invention was the tilting means adopted for the collapse and expansion of the cutters—in combining that means with inter-related dovetails on the cutters and ways of the body extension," as stated by the lower Court, *he would without any question, have made certain that the relation between these two operative features was specifically and unmistakably described in the claims of his patent.* The phrase in claim 1, quoted by the lower Court and upon which he bases his decision that the claim covers these two features, is not even an accidental reference to this relationship and no such a construction can be said to be "the plain import of its terms."

Enough has been said to show that the hypothetical device, described by the lower Court and

upon which he bases his decision, is not covered by the claims of the Double patent, nor was it contemplated by the inventor of the Double underreamer.

In our attempt to arrive at exactly what elements are included in the Double combination patent we will next consider what, in the opinion of opposing counsel, this invention covers. In his brief before the lower Court the following statements occur (official transcript of argument):

“The open slip-ways and the cutter shanks in these slip-ways so interrelated that the casing-shoe may contact with the outer surfaces or shoulders of the shanks close to the fulcrum and cause the necessary amount of inward throw of the lower ends of the cutters; also the interrelated dovetails of the cutter shanks and slip-ways. These are found in the Double invention for the first time. These are part of the combinations claimed by the Double patent * * *.”
P. 15, line 8.

“The ‘tilt-slip’ action of the Double invention is secured by this novel conception of the open slip-ways and the outwardly extending portions of the cutter shanks for contact with the casing-shoe, and the provision of the key-seats or sockets (16) of somewhat larger size than the key or head of the rod for carrying the cutters. This combination existed in no prior reamer.
* * * The further provisions of the interrelated dovetails on the slip-ways and cutter shanks, in connection with this ‘tilt-slip’ action is not found in any prior underreamer. It was a novel combination produced by Mr. Double.”
P. 16, line 1.

“Contact of the casing-shoe high up on the shanks of the cutters was necessary to secure the necessary amount of inward throw of the lower ends of the cutters in collapsing. Mr. Double conceived this. The difference between the open slip-way construction and the socket form is radical. One spells inoperativeness and failure and the other success.” P. 14, line 3.

“The principle of extending the shanks of the cutters through the sides of the body in these open slip-ways so that the casing-shoe may contact with the outer sides of these shanks high up about (above) the cutting edges and close to the fulcrum of the cutters on the spring-actuated rod is not utilized in this O'Donnell & Willard Patent. These were new and novel to Double. They were a part of Double's contribution to the art.” P. 13, line 2.

These are the only statements in the brief of opposing counsel before the lower Court which seem intended to define the Double invention. We find them to be the same as the description of the Double patent given by the lower Court in its opinion and which has been fully commented upon herein. It is plain that the lower Court accepted without question the combination of elements described by opposing counsel as making up the Double underreamer. “The tilting means adopted for the collapse and expansion of the cutters—in combining that means with the inter-related dovetails on the cutters and ways of the body extension.” The opposing counsel merely explains further that this ‘tilting means’ consists of such modification of cutter and shank as will permit the casing-shoe to contact with the shank

high up above the cutting edge and close to the fulcrum upon which the tilting action occurs—that is, close to the key which suspends the slips.

It is true that in the Double patent drawings the shoulder on the slip or cutter (just below the hole marked 20) and which contacts with the casing-shoe to cause the cutters to collapse, is almost opposite the key 17 by which the slips or cutters are suspended. It was imperative that this shoulder be placed at this point, for to place it lower on the cutter would require removing more of the stock from the outside of the cutter where it had already been dangerously weakened by the removal of material from the inside to furnish the inward projection 18 with its upwardly sloping face 26. *This was the object of having the casing-shoe contact with the cutters at a point high up above the cutting edges and close to the fulcrum of the cutters on the spring actuated rod. No tilting action was so obtained that had not already been obtained in the Brown underreamer and the Jones round nose underreamer and no advantage was obtained by this design other than to strengthen the cutters.*

On the other hand, a careful study of the patent drawings will show that, in the Wilson underreamer, the shoulder 30 on the cutter shank is some distance below the point of suspension of the cutter on the cross or tee 5, and in this respect following the design of the Brown cutter. This is possible in the Wilson underreamer because the shoulder can be

placed *anywhere* on the cutter shank without weakening the cutter as there is no stock removed from the inside to leave the inward projection 18 which is a feature of the Double patent and mentioned in its claims as one of its elements. The same result was accomplished in the Brown patent by making a head 20 on the downward extension 7, with opposite, parallel bearing faces 21. It was then necessary only to cut a recess or notch 17 in the shank of the cutter to receive this head when the cutters were collapsed, and this notch also formed the inward projection 19 to bear upon the opposite, parallel bearing faces 21, and the equivalent of the downwardly sloping upper faces 26 of the inward projections 18 in the slips 15 of the Double underreamer.

The next point mentioned by the opposing counsel in the Double combination is, as quoted above, "the principle of extending the *shanks* of the cutters through the side of the body in these open slip-ways" which he says is to permit of placing the shoulder on the slip up opposite the fulcrum or key. It has been shown that this was necessitated in order to prevent weakening the already dangerously weakened cutter—a condition which does not exist in the Wilson underreamer and therefore the shoulder may be placed *in a more advantageous position* to accomplish its work—which is lower down on the cutter shank and directly opposite the work that is to be done.

Referring now to the principle of extending the shanks of the cutters through the sides of the body in

these open slip-ways, the slips in the Double underreamer in suit did not contain *shanks* in any sense of that word, nor was the word *shank* used anywhere in the specifications or claims of the Double patent. The slip-ways were open in the same sense that they were in the Swan, the Jones' Round Nose, and several other older underreamers and, following the designs of these underreamers, the slips in the Double underreamer were as broad at the top as they were at the bottom or cutting end. *Shanks* were not necessary to its construction because the cutters did not collapse between forks or prongs projecting from the mandrel as in the Wilson device, nor pass inside of the mandrel at their upper ends as in the Brown design. This design of the slips in the Double underreamer caused it to have the same fatal defect as characterized the Swan patent, namely, the narrow cutting edges of the slips failed to cut a round hole and the hole became 'rifled' or 'key-seated' as it is called in the art. (See opinion in *Wilson vs. Union Tool Co.*, 237 Fed.) This defect in the Double underreamer was not remedied until the Wilson device, containing cutters with shanks and a broad cutting head, was placed on the market, and Double promptly copied this feature in his several 'improved' designs which have been held to be infringements of the Wilson patent in Consolidated cases A4 and B62 (237 Fed., *supra*). *Wilson and not Double is the inventor of the principle of extending the shanks of the cutters through the sides of the body in these open slip-ways, and for the reason that the Double slips did not have*

shanks in the sense of that term as the opposing counsel would have this Court understand.

Double's shankless cutters at all times, open or collapsed, are separated by and bear against the solid face of the bottom of the slip-ways, namely, the opposite parallel bearing faces of the hollow slotted extension, precisely as in the Swan underreamer, for example, while the Wilson underreamer at no time has anything between the *shanks* of the cutters, expanded or collapsed, except the spring-actuated cross or tee rod.

While neither Double's underreamers nor his patent specifications or claims contain or mention the word "shanks," Wilson was granted claims covering this unique, novel and revolutionary feature of his device. Attention is called to the following claims of the Wilson patent:

"Claim 16. An underreamer cutter having two shoulders and a bearing face on the inner side of each of the two shoulders of the cutter.

"Claim 17. An underreamer cutter having a *shank* and a shoulder on either side of the *shank* of the cutter, each of said shoulders projecting at right angles to the shank of the cutter and having a bearing face on its inner side."

From this analysis of the opposing counsel's statements of the elements which make up the Double combination it will be seen that he evaded the description of the Double combination as given in the

claims of said patent and, *from a confusion of its mechanical parts and modes of operation, has constructed a new combination not even remotely described in those claims.* Had the appellee believed that the claims of the Double patent were infringed by the Wilson underreamer, he would have based his case upon the combinations described in those claims and would have made clear the elements comprising those combinations, instead of reconstructing the claims to fit the Wilson reamer, and departing from the Double claims.

The only way to arrive at precisely what combination of elements are covered by the Double patent is to carefully analyze the claims of that patent. First, however, we will briefly outline the history of the Double underreamer and the present litigation as shown by the evidence in this case.

The Double underreamer appeared on the market about the time that deep well drilling became imperative in California because of the exhaustion of the shallower territory. This was about in 1901 and 1902. As shown by the evidence, it soon enjoyed a certain amount of sale and doubtless had some advantages over many of the underreamers then on the market. However, it also had many grave defects of design and construction so that, also as shown by the evidence in this case, it failed to displace, and was obliged to compete with, a number of the older designs of underreamers, such as the Swan, Austrian, Plotts, North and Kellerman. These defects will be enlarged upon later in this brief.

Much evidence has been introduced by the appellee to show that the advent of this underreamer immediately caused a greatly increased development of the oil fields throughout the country, but this is only an attempt to have the effect mistaken for the cause. The fact is that, beginning about in 1902, the oil industry in California enjoyed a wonderful growth. The following table prepared by the California State Mineralogist gives the total production of petroleum for the years specified:

1898	2,248,088 barrels
1899	2,677,875 “
1900	4,329,950 “
1901	7,710,315 “
1902	14,356,910 “
1903	24,340,839 “
1904	29,736,003 “
1905	34,275,701 “
1906	32,624,000 “
1907	40,311,171 “
1911	78,195,000 “

To argue that the Double underreamer was responsible for this enormous growth of the oil industry in California is to ignore altogether the remarkable development of the market for oil in this territory. It would doubtless be shown that the types of underreamers antedating the Double patent also enjoyed increased sales due to this prosperity. The record shows large sales for the Austrian at this time. The lower Court finds that: “By the

use of the Double underreamer a much greater depth was attained, not infrequently twice as deep as formerly." This was not due to the nuderreamer but to the demand for oil.

During the earlier history of the oil fields of California the shallow portions of the fields were being exploited and, as this shallow territory became exhausted, and the demand for oil increased, the drillers followed down the dip of the oil-bearing strata with deeper and deeper holes. The exhaustion of the shallow territory and not the Double underreamer caused the drillers to requisition every device known to the art in order to reach the oil strata below the horizons where the oil had been exhausted. As this exploration work extended deeper and deeper and drillers gained experience and overcame the difficulties confronting them. Heavier casing was found to be necessary and the calf-wheel was invented to handle it. The inventor of the calf-wheel, Mr. Kellerman, who has testified in this case, also invented a practical underreamer. This deep well drilling was also facilitated by the use of wire drilling rope, which made possible the use of heavier drilling tools. Underreamers were only one of many devices which minimized the difficulties of deep drilling.

Improvement continued to be made in the design of underreamers until the Wilson device was produced. It promptly rendered obsolete the original Double type which is the subject of this suit, and it

has enjoyed rapidly increasing sales until now it, and its imitations manufactured by the Appellee, and which have been adjudged to be infringement of the Wilson patent, have practically displaced all other makes of underreamers.

As inventions it must be conceded that the use of the heavy casing, the calf-wheel rig and the use of wire drill rope contributed more to the success of deep well drilling than did any type of underreamer, although it is to be admitted that the Double underreamer enjoyed a great sale after it was modified to closely resemble the Wilson patent with which it was unable to compete with any degree of success until such modification had been made.

That the Double underreamer was only a step in the art is obvious from the great popularity that attended the introduction of the Wilson underreamer, and the fact that the Appellee and its predecessors promptly copied its salient features and discontinued the manufacture of the design covered by the patent in suit. *This modification of the original Double type is known as the Double Improved Underreamer, and it is highly significant that the Appellee exhibited an underreamer of this type in the lower Court and represented it to be the device illustrated and described in Patent No. 734,833; and it was necessary for the Appellant to search the country for, and exhibit before the lower Court, an underreamer of the original and rejected and obsolete type covered by the Double patent in*

suit. This Appellee was not anxious to exhibit an underreamer of the type described and covered by the patent in suit but submitted, as an example of that underreamer, a totally differently device following the teachings of the Wilson patent and which has since been pronounced by the lower Court to be an infringement of the Wilson underreamer patent. This was a foxy but flagrant misrepresentation directed at convincing the Court that Appellant's underreamer included not what was its own to use, but what was implied to be Double's invention. Appellant endeavored to convince the Court that Wilson's invention was theirs. The Court was not so deceived.

The original Double underreamer, as described by the patent in suit, is not to be found in use anywhere today, and for the reason that it was promptly displaced by the Wilson underreamer and its imitations which were made by the Appellee. The Appellee's later catalogues, as in evidence in case No. 2918, does not even show it. On the other hand, no underreamer has been satisfactorily introduced on the market since the invention of the Wilson underreamer if we except these imitations which have been made by the Appellee Company. It can be said of the Double underreamer, as described in patent No. 734,833, that "It emerged from oblivion solely to meet the exigencies of this litigation." If it were a practical device, why does not the defendant use it and so escape the charge of infringement? *"Is not the presumption almost conclusive that it*

was not used because it was not usable?" (Quotations from *Cimiotti Unhairing Co. vs. American Unhairing Mach. Co.*, 115 Fed. 500.)

The case just cited is particularly forceful when applied to the situation under discussion. We are asked to believe that the Double Patent in suit covers a device which was a pioneer in the art. That it was the last step in perfecting a machine upon which the development of the oil fields of the world had long waited. Yet its manufacture was discontinued with the advent of the Wilson underreamer and its manufacturers immediately began the manufacture of underreamers of types each of which follows more closely the teachings of the Wilson patent. Wilson finally obtains a judgment decree finding infringement, against each and all of these imitations of his device, and the Appellee furnishes a large bond, \$25,000, to enable it to continue its manufacture pending an appeal from the decision of the lower Court. Why furnish this bond to manufacture these infringing types when he is perfectly free to manufacture the Double type, Patent No. 734,833, which we are told is the last step in perfecting underreamers? Why was this type discontinued in the first place?

"The inquiry is pertinent, why was it that this machine was permitted to remain unused?

"Since the success of the Sutton apparatus every effort has been made by infringers to evade it by introducing specious changes of form and yet, if we are to accept the contention

of appellant, there is an operative machine in existence doing the work as well as the Sutton machine and free to anyone who desires to use it. Even within the last few years, when infringers have been in desperate straits and have resorted to every conceivable device, it seems to have occurred to no one that the Lake machine might furnish the necessary means of escape. *Is not the presumption almost conclusive that it was not used because it was not usable?"*

Cimiotti Unhairing Co. vs. American Unhairing Machine Co., 115 Fed. 500.

The reason is apparent. The Double device in suit was only a step in an art which was completed by the last step taken by Wilson. The evidence shows that the underreaming field is practically monopolized by the Wilson underreamer, and its infringements by the Appellee, and this evidence also shows that shortly after the introduction of the Wilson patent the Appellant found it necessary to erect a manufacturing plant to meet the demand for Wilson underreamers, and this plant was soon running day and night shifts to keep pace with this demand.

"Apart from the presumption of novelty that always attends the grant of a patent, the law is that when it is shown that a patented device has gone into general use and has superseded prior devices having the same purpose, it is sufficient evidence of invention in a doubtful case." *The Barbed Wire Patent*, 143 U. S. 275, 292, 12 Sup. Ct. 443, 36 L. Ed. 154. *Keystone Manufacturing Co. vs. Adams*, 151 U. S. 139, 143, 14 Sup. Ct. 295, 38 L. Ed. 103. *Irvine vs.*

Hasselman, 97 Fed. 964, 38 C. C. A. 587. *Wilkins Shoe Button Co. vs. Webb* (C. C.), 89 Fed. 982. *National Hollow B. B. Co. vs. Interchangeable B. B. Co.*, 106 Fed. 697, 909, 45 C. C. A. 544.

“‘In the law of patents it is the last step that wins’, says the Supreme Court. This is the step which Gorton took.” *George Trost Co. vs. Cohn*, 112 Fed. 1009, affirmed (C. C. A. 119 Fed. 505.

It is true that with some devices their general use is not conclusive of invention. Skillful salesmanship or superior advertising ability or facilities might introduce an article that is inferior to a similar device on the market. With underreamers, however, the argument of their general use must be convincing because they are used only by the men who are skilled in drilling operations and who understand the devices of their trade. The success of the Wilson underreamer was due to its intrinsic merit as an invention.

“It cannot be disputed that complainant’s device went into general use, has been very extensively availed of by surface railways operated by electricity and has practically supplanted all others. The respondent suggests that this is largely, if not entirely, due to artful advertising on the part of the complainant, indeed so artful as to be to some extent fraudulent. A suggestion of this character would have great force with reference to an article sold to the public at large, but is of little value in the present case, where the device is used by mechanics of skill in their art.” *Consolidated Car Co., vs. American Heating Co.*, 82 Fed., 996. See also *Loom Co. vs. Higgins*, 105 U. S.

The testimony in this case shows that when the Appellant, Wilson, produced his underreamer he was a poor boy, and at this time the Double underreamer was being manufactured by a strong Company with efficient and far-reaching selling agencies and backed by its parent company, the Union Oil Company with its powerful influence in the oil fields. Notwithstanding this handicap, however, the Wilson device promptly drove the original Double underreamer out of the market. In the face of such evidence it is difficult to understand the contention of opposing counsel that this *discarded* Double underreamer was *the last step in the art* and that the Wilson underreamer is merely an improvement upon it.

Besides infringing the Wilson patent the Appellee Company sought other methods of driving Wilson out of competition in the manufacture of underreamers. The Appellee instituted this suit in 1908 but failed to proceed with same notwithstanding the attempts of Wilson to have the case proceed to a hearing. The case was dismissed in 1910 for want of prosecution. It was re-filed and lay dormant for years before the Appellee (complainants) began to take testimony. Eventually and after much effort on the part of the Appellant (defendant) it was heard by a lower Court in 1916. As has been said, the Appellant secured a decision against Appellee in which its several imitations of the Wilson underreamer were held to be infringements. This was in Equity suits No. A4—B62 consolidated and tried

with this case, and now on appeal here as Case No. 2918.

Also in the appeal decided on November 8, 1915, *Wilson et al vs. Double et al*, 227 Fed., 607, *supra*, we find this same Double loses the suit which is brought by himself and one Bole against the present Appellant and its president, Wilson, for infringement of an underreamer patent made up of the Wilson underreamer combination of elements in which was included a key which Wilson had designed, manufactured and applied for patent upon. Bole who was employed by Wilson, applied for patent on the key almost coincidently with Wilson, was granted the patent and assigned a part interest to Double, and with him instituted suit for infringement against Wilson, the patent office inadvertently issuing the patent to Bole and Double. In the citation given, Wilson was found to be the true and original inventor, and the patent office had twice previously decided the case in favor of Wilson. It is instructive to note that the principal piece of evidence submitted by the complainants in that case was an alleged sketch of the device in suit. This court characterized this sketch as *a peculiar and suspicious piece of evidence*, and stated "*We are far from convinced that the sketch is genuine, or what it purports to be.*" (*Wilson et al vs. Double et al*, 227 Fed. 607, *supra*.)

The history of this case shows a long-continued effort on the part of the Appellee to harass the

Appellant with litigation which, at least in the case of *Double et al vs. Wilson et al*, above cited, was so lacking frankness and fair play, as to call forth the scathing comment of this Court. For years the Appellee has prevented the Wilson patent from being salable by submerging it in litigation which said Appellee was unwilling to have proceed to a hearing, and has placed the Wilson reamer business under a cloud.

The evidence submitted in this case by the Appellee and the brief of opposing counsel before the lower Court betray an unwillingness to state clearly the exact nature of the Double invention, as covered by the claims of the Double patent, and to base their case upon a precise definition of that invention. *We have shown that the Appellee, in his argument before the lower Court, created from his imagination a combination which he represented to be the Double invention but which is not described by any of the claims of the Double patent in suit.* Also we have shown that the decision of the lower Court was based upon this hypothetical combination which the Court virtually admitted was not covered by claims 2, 6, 7 and 8 of the Double patent but which he, nevertheless, held were infringed by the Wilson underreamer, and which we have seen was not covered by claim 1.

In order to arrive at an exact understanding of the Double underreamer invention we will now analyze the claims of the Double patent in suit. It

has already been stated that the Appellee admits that claims 3, 4 and 5 of the Double patent are not infringed by the Wilson underreamer, so it will not be necessary to consider them in this analysis. The remaining claims are as follows:—

1. An underreamer comprising a hollow mandrel furnished with an internal shoulder, a downward extension having opposite parallel bearing-faces having a key-way therein, shoulders at the sides of such extension, and upwardly and inwardly sloping dovetail slipways beneath said shoulders; a spring on the shoulder in the hollow mandrel; a rod playing in the mandrel furnished with a key-seat and supported by the spring; dovetail tilt-slips playing in the slipways and furnished with key-seats respectively; a key in the key-seats of the slips and rod and playing in the keyway of said extension to hold the slips against the shoulders; said slips being furnished with inward projections to slide upon the downward extension of the mandrel to spread apart the cutting edges of the slips when the slips are drawn up.

2. An underreamer furnished with a mandrel having a downward extension provided with opposite parallel bearing-faces and a key-way in the extension; a spring-supported rod furnished with a key-seat and playing up and down in the mandrel; tilt-slips slidingly connected with the mandrel and furnished with inward projections to slide upon the opposite bearing-faces of the downward extension to spread the slips apart at the lower ends when the slips are drawn up; and a key carried by the rod and carrying the slips.

6. In an underreamer, a mandrel furnished with a hollow slotted extension, the lower end of which slopes upward at the edges; tilt-slips slid-

ingly connected with the mandrel and furnished on their inner faces with projections, the upper faces of which slope downward to slide upon the extension of the mandrel; and means connecting the slips with the rod.

7. In an underreamer, the combination with a hollow mandrel, provided with a slotted extension, a spring-actuated slip-operating rod provided with a pivot-key, tilt-slips provided with key-seats adapted to be engaged by said pivot-key, said key-seats being somewhat larger than the key to allow the slips to tilt, said slips being provided with inwardly-projecting shoulders, and said slotted extension provided with surfaces adapted to tilt said slips and hold the same in expanded position.

8. In an underreamer the combination of a hollow mandrel with a hollow slotted extension, said extension having opposite parallel bearing-faces, a slip-carrying rod in said mandrel, slips connected to said rod, said slips having projections which bear against said extension, said slips being provided with key-seats, a key carried by said rod, each end of the key lying in a key-seat of a slip, and the key-seat in each slip being somewhat larger than the key to allow the slips to partake of a tilting action.

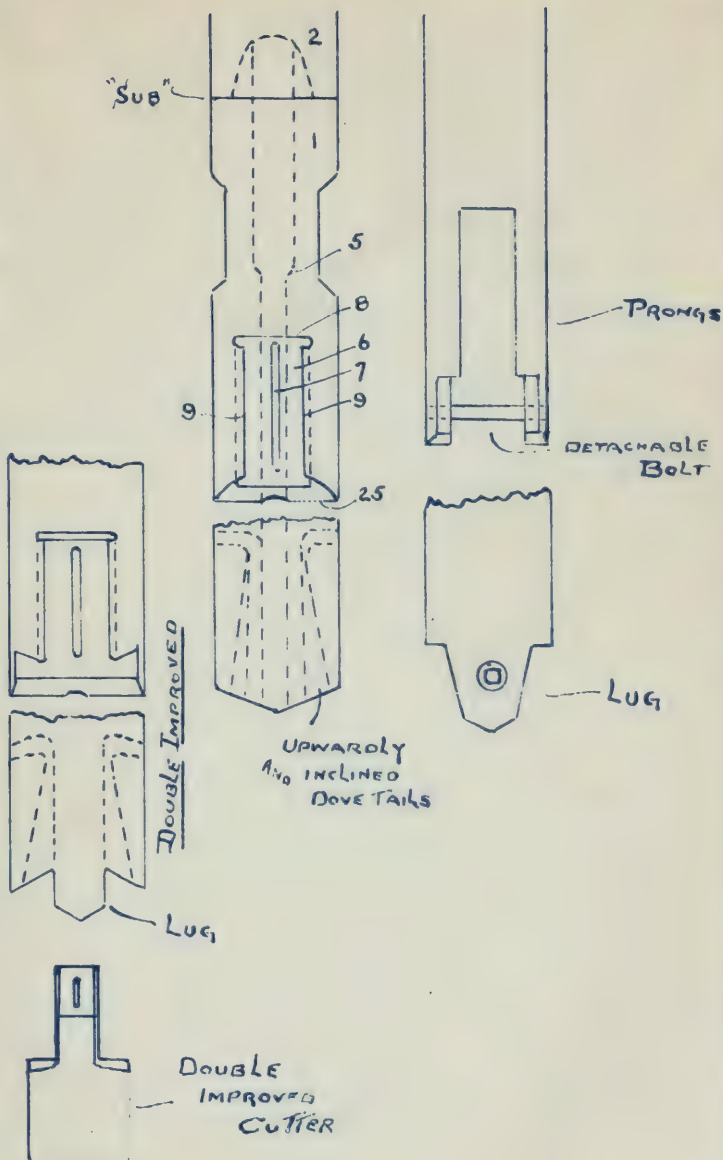
The first part of the Double underreamer to be considered is the hollow mandrel, or body, which is a part of all the underreamers which have been devised. In order to differentiate his mandrel from other hollow mandrels Double details and describes its features which he claims as elements in his combination. It was impossible for Double to obtain a patent upon a hollow underreamer mandrel without defining such elements of its construction as would

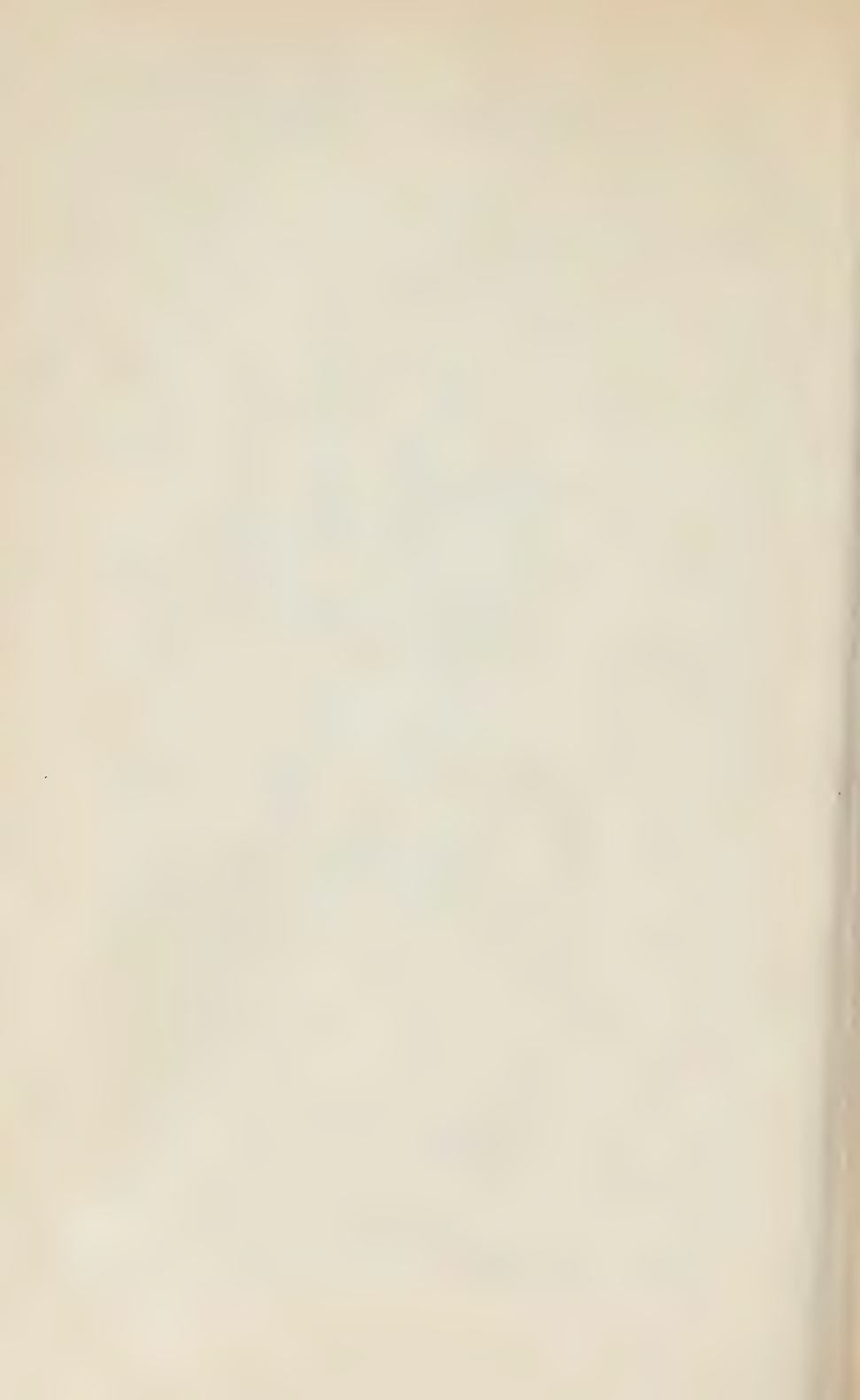
differentiate it from the hollow mandrels to be seen in other underreamers. The description of the features contained in the Double mandrel greatly narrows the Double invention and *we do not hesitate to say that the Commissioner of Patents would never have allowed a patent to issue upon the loose and highly comprehensive description of the Double hollow mandrel which the lower Court arrived at by its amazing application of the doctrine of equivalents.*

The features or elements limiting and defining the Double mandrel as enumerated in the claims of the Double patent in suit are as follows:—I. the mandrel 1 is *hollow* or has a longitudinal hole for the reception of the spring and rod. II. This hole has an internal shoulder (5) upon which the spring is seated. III. The lower end of the mandrel has a *downward extension* (6), the form of which is narrowly limited in the claims to a *downward extension* which is, IV, hollow or drilled longitudinally for the reception of the spring-actuated rod (11); V. It is slotted (7) for the reception of the key (17) upon which the slips (15) are hung, and, VI, It has opposite parallel bearing faces upon which the inward projections (18) of the slips rest when in reaming position. Also, VII, The bottom edge of this downward extension has rounded or upturned faces (25). VIII. There are shoulders at the side of the downward extension (8); IX. Dovetails (9) sloping upwardly and inwardly beneath said shoulders; and, X, a “sub” or joint member (2) which subdivides the mandrel and confines the rod and its spring.

DOUBLE REAMER

WILSON REAMER





The Wilson underreamer also has a mandrel which is hollow (1) or has a longitudinally-drilled hole for the reception of the spring-actuated rod (5), but it does not have the internal shoulder (11), upon which the spring seats. In the Wilson device the spring seats upon a removable key or a block (7), which was the subject of the suit above referred to, *Wilson et al vs. Double et al*, 227 Fed. 607, *supra*, in which Wilson and not Bole was adjudged to be the inventor of this key combination. The seating of the spring upon this removable key or block instead of upon a fixed shoulder in the mandrel is original with the Wilson underreamer. The key (17) in the Double device is for another purpose altogether, viz., connecting the slips with the spring-actuated rod, and resembles the Wilson key only in name. The Appellee's witness, Griffin, tries to confuse the Court as to the function of this key in the Wilson device which forms the spring seat in the mandrel and is removable so as to permit the underreamer to be assembled without the use of the "sub" joint which is a highly detrimental feature of the Double mandrel. The inter-relation between this key or block and the form of the bottom of the mandrel in the Wilson underreamer, which permits the whole device to be assembled from the bottom, was epoch-making in the design of underreamers as it eliminated the use of the "sub" (Xa) or extra joint in the body of the underreamer which frequently caused the Double underreamer to be lost in the drill hole, and ruined the hole or caused great expense in drilling or otherwise removing the ob-

struction. See testimony, Wrenn (R. 248-249), as follows:

“My next experience was at Coalinga in 1907. I bought and ran three Wilson,—10 inch, two eight and a quarters, and six and five-eighths, using them continually from that time on. During that period I also used one Double of the older pattern, 12½ inch. I now have four or five Double reamers. ‘Complainants’ Exhibit Double Reamer’ is the general type, of course they have made slight differences in them, and improvements, of course. This exhibit represents the general plan of both the first and second kinds of Double reamers. I don’t know that I could specify the change made in the Double reamer unless I had the first Double reamer before me. The new reamer has more stock in it—much heavier,—a very great improvement over the old. I was rather unfortunate in the use of the first Double reamer and became considerably prejudiced against the reamer, in that the joint of the 12½ that I was using, the pin, broke off, leaving the whole bottom part of it in the hole, causing me to have to move the derrick and drill a new hole. That was in 1907 or 1908. The pin broke off square and we could not fish it out. We had to move the rig and redrill the hole. I should judge the abandoned hole had cost me to that date between fifteen hundred and two thousand dollars. The underreamer itself I had to pay for, which was, I think, three hundred and some dollars. It was rented.”

See also testimony of Kebele (R. 208):

“I have known of Double underreamers giving trouble at the middle joint. Same occurred on the Peerless Oil Company’s property in the Kern River Field. The reamer came unscrewed at that joint. They fished the broken part out.”

The form of the bottom of the Wilson mandrel is so different from that of the Double device that they can scarcely be compared. The bottom of the Wilson mandrel has two prongs (2) terminating in lugs (2') which spread the cutters apart into reaming position and hold them so spread. Above the lugs and inside of the prongs are parallel shoulders (2''), *not dovetails*, which form ways (3) for the shoulders (4²) on the cutter *shanks* (4'). The lower ends of the lugs have beveled faces (9) for spreading the cutters apart to reaming position. The prongs generally are, although not necessarily, strengthened by means of a detachable cross piece (11) and which also, when detached permits assembling of the reamer parts at the bottom.

A careful comparison of these features of the Wilson and Double mandrels will convince any mechanical mind that they are designed to operate upon entirely different principles. Their *modes of operation* are entirely different. The Wilson mandrel does not have, II, the internal shoulder; III, the downward extension, with its, IV, hollow; V, its slot; VI, its opposite parallel bearing faces; VII, its rounded or beveled lower edge; VIII, its shoulders at the side of the downward extension; nor, IX, the dovetails sloping upwardly and inwardly beneath the shoulders, nor Xa, the "sub" or joint. The Wilson mandrel has the hollow or longitudinally-drilled hole for the reception of the spring and rod, just like any other reamer, and the shoulders inside of the prongs for the reception of the cutter shanks, which shoulders being parallel do not permit any

sliding action of the shanks of the cutters upon the suspension means to permit tilting. So, the Wilson cutters could not "tilt" even if the principle of expansion required or permitted, which it does not. (See testimony of Wilson, R. pp. 195, 196.)

By no stretch of the imagination, however, can the Wilson mandrel be said to contain the other enumerated features of the Double mandrel and for the reason that their mode of operation, as well as their construction, is entirely different.

Now the slot (7) of the Double patent performs a very vital function in the action of the reamer. In addition to being a key guide or key-way, its lower wall serves as a stop for the key or the downward travel of the rod, key and cutters. Were it not for this stop over-travel of these parts would occur, and the cutters be liberated from their ways and the cutter-key and be lost in the hole. Obviously no such part with any such function is to be found in the open space between the Wilson body prongs. With the Wilson patented form of reamer a device not shown in the patent was used, namely, a pipe surrounding the rod and within the spring and resting upon the detachable block (7) and engaging the spring-confining nut on the rod to limit the downward play of the rod. (See Defendant's Exhibit Wilson Reamer No. 1, and testimony Wilson R. 190). In the key type of Wilson reamer (Wilson Reamer No. 2), the removable key in the body serves the double function of supporting the spring at its lower end and acting as a stop to arrest downward

travel of the rod by engaging with the upper wall of the elongated slot in the rod.

Manifestly entirely different means from the cutter carrying key and extension slot (7) of the Double reamer are employed in the Wilson reamer for performing this rod-checking function. This marked differentiation alone completely refutes the opinion of the lower Court that the Wilson pronged type of underreamer body is the equivalent of the narrowly claimed hollow slotted extension type of Double underreamer body. The "slot" feature of the Double "extension" with its two functions is absolutely missing in the Wilson reamer.

The opposing counsel argues that any kind of a projection on the bottom of an underreamer mandrel, or a group of such projections, is a "downward extension" within the meaning of the detailed description of the "downward extension" in the Double patent. If the Double underreamer patent should cover all forms of underreamer construction having projections at the bottom of the mandrel is it not strange that the claims of that patent should not have been worded so as to cover all such forms of construction and particularly if we are to believe that such a claim in the Double patent would have been allowed by the Commissioner of Patents over the Swan and other "downward extensions"? Also the Appellee argues that the space between the prongs or forks of the Wilson underreamer mandrel *is a hollow and a slot merged together*. This Court will doubtless not wish its time taken up with the

discussion of such absurdities as result from fallacious and cunning attempts to broaden the meaning of narrowly worded claims, by the use of words only. In *Westinghouse vs. Boyden Power Brake Co.*, 170 U. S. 568, it is said:

“But even if it be conceded that the Boyden device corresponds *with the letter of the Westinghouse claims*, that does not settle conclusively the question of infringement. We have repeatedly held that a charge of infringement is sometimes made out, though the letter of the claims be avoided. *Machine Co. vs. Murphy*, 97 U. S. 120; *Ives vs. Hamilton*, 92 U. S. 426, 431; *Morey vs. Lockwood*, 8 Wall, 230; *Elizabeth vs. Pavement Co.*, 97 U. S. 126, 137; *Sessions vs. Romadka*, 145 U. S. 29; *Hoyt vs. Horne*, 145 U. S. 302. *The converse is equally true.* The patentee may bring the defendant within the letter of his claims, but if the latter has *so changed the principle of the device* that the claims of the patent, literally construed, have ceased to represent his actual invention, he is as little subject to be adjudged an infringer as one who has violated the letter of a statute has to be convicted, when he has done nothing in conflict with its spirit and intent. ‘An infringement,’ says Mr. Justice Grier in *Burr vs. Duryee*, 1 Wall., 531, 572, *‘involves substantial identity*, whether that identity be described by the terms “same principle,” same “modus operandi,” or any other * * *. The argument used to show infringement assumes that every combination of devices in a machine which is used to produce the same effect, is necessarily an equivalent for any other combination used for the same purpose * * *. This is a flagrant abuse of the term “equivalent.” ’ ’ ’

Appellee would have it that Appellant infringes because Appellant expands and contracts his cutters. This *result* was not claimable by Double, and mere results are not patentable.

The next part of the Double device to be considered will be the slips or cutters. These are "tilt slips," slidably connected with the mandrel (1), and with X, dovetails (29) playing in slipways (9) on the mandrel (1); XI, with keyseats larger than the key (17); XII, with inward projections (18) which slide upon the downward extension (6) of the mandrel; XIII, and with the upper faces of these inward projections sloping downward as at 26.

The Wilson cutters do not use the elements numbered XII and XIII, and for the reason that the Wilson mandrel does not have a "hollow, slotted downward extension" *against which the cutters must rest at all times, collapsed or expanded, as is the case with the Double device.* The Double cutter does not contain *shanks*, while the Wilson cutter is made up of a *cutter head* (4) and a *long shank* (4'), and the originality and novelty of this construction is attested by the fact that Wilson was granted basic claims upon it. (See claims 16 and 17 in the Wilson patent.)

This design of cutter co-operating with the special design of the Wilson mandrel permits the cutter heads to bear solidly against the prongs when in reaming position but, when collapsed, the cutter head is below the prongs and the shanks are in be-

tween the prongs. This novel interrelationship between the Wilson pronged mandrel and the Wilson cutter with its shank and head and bearings (4³) on the laterally projecting shoulders of this head make possible the mode of operation *which is essential to a completely successful underreamer* and which the most expert mechanics and inventors in the art had striven vainly to obtain, viz.—*that the portion of the mandrel which serves to spread the cutters and hold them apart in reaming position SHALL NOT BE BETWEEN THE CUTTERS WHEN SAID CUTTERS ARE IN COLLAPSED POSITION. It is elemental, that, with this construction, the cutters can be given unheard-of strength for the reason that no material has to be removed from them to make room for the spreading device when the cutters are collapsed.*

We submit that the Wilson underreamer is the first underreamer ever designed which successfully met this requirement. An examination of all previous underreamers including the Double will show that, if a continuous extension or portion of the mandrel was used to spread the cutters when in reaming position, that continuous extension or portion of the mandrel **REMAINS BETWEEN THE CUTTERS WHEN THEY ARE COLLAPSED**. Inventors had sought to solve this problem by using some form of a movable spreader and bearing, as in the Kellerman patent, and also had sought to dispense altogether with a spreader and bearing as in the North patent in which the cutters would rock on each other inside a bowl. These de-

signs, however, were all unsatisfactory as it was found that the requisite strength could be obtained only *by having the spreading bearing a fixedly connected portion of the mandrel.*

The remaining parts of the Double underreamer to be considered are the rod with its spring and key. This rod (11), XIV, plays in the mandrel; XV, is supported by a spring (10); XVI, contains a key-seat (12) in which is, XVII, a key (17); XVIII, which plays in the slot or keyway in the downward extension (6), and, this key has, XIX, a notch (22) to permit the rod to engage it and thus prevent its displacement during operation.

The Wilson underreamer has a rod or stem (5'), with a "cross" or "tee" (5) which, as a single member of great strength, plays in the mandrel, is supported by the spring (6), XV, and draws the cutters upward into reaming position. This "cross" or "tee," however, does not contain a key-seat, XVI, nor a key, XVII, playing in the slot or keyway of the downward extension of the mandrel, XVIII; and of course, having no key, the notch in said key, XIX, is not found in the Wilson device. To be sure there is a slot cut in the rod or stem of the Wilson Reamer No. 2, to allow room for the vertical play of the rod or stem (5'), but the "seats" for this key are in the mandrel and not in the "rod" or stem, nor in the slips; and this key is a part of the mandrel and does not belong to the rod nor stem. The function of this key has been fully explained in connection with the above description of

the Wilson mandrel, and it will be noted that it performs an entirely different function from the key in the Double underreamer.

On the following page will be found a table showing the elements of the Double underreamer grouped together to represent the several claims of the Double patent. A separate column in this table shows the elements of these combinations which are to be found in the Wilson combination. It has not been considered necessary to include in this comparison claims 3, 4 and 5 of the Double patent for the reason that it is conceded by the Appellee that they are not infringed by the Wilson device, but they would only show a still greater difference between the Double and Wilson underreamers.

	Double Claims					Wilson Device
	1	2	6	7	8	
Mandrel						
I. Hollow	I			I	I	I
II. Internal Shoulder	II					
III. Downward Extension..	III	III	III	III	III	
IV. Hollow			IV		IV	
V. Slotted	V	V	V	V	V	
VI. Opposite parallel faces	VI	VI			VI	
VII. Bottom edge upturned			VII	VII		
VIII. Shoulders at sides of downward extension..	VIII					
IX. Dovetails sloping up- wardly and inwardly	IX					
Slips.						
X. With dovetails playing in slipways	X					
XI. With keyseats larger than key	XI			XI	XI	XI
XII. With inward projec- tions	XII	XII	XII	XII	XII	
XIII. With upper faces slop- ing downward			XIII			
Rod.						
XIV. Plays in mandrel.....	XIV	XIV			XIV	XIV
XV. Supported by spring....	XV	XV		XV		XV
XVI. Contains keyseat	XVI	XVI			XVI	
XVII. Contains a key.....	XVII	XVII		XVII		
XVIII. Key plays in slot of downward extension..	XVIII					
XIX. Key has notch to en- gage rod (Claims 3 and 4 only)						

The table plainly shows what elements the patentee of the Double device considered to be essential to his combination viz.—III, The downward extension (6); V, The slot in the downward extension (7); XII, The inward projections on the slips (18). These are included in every claim under consideration and plainly were considered to be the essential features of, and intended to be fully covered by, the patent. Not one of these elements of the Double patent is found in the Wilson reamers. We repeat that in common with a number of other elements of the Double combination, these features are not to be found in the Wilson underreamer nor anything that can be considered their equivalents. In fact, by the broadest application of the doctrine of equivalents, it will be seen that the Wilson underreamer uses only five of the nineteen elements which make up the several claims of the Double combination. We submit that it is incontrovertible that there are a number of elements positively included in detail in each of the claims of the Double patent which are not to be found in the Wilson underreamer, either those elements or their equivalents. Also even if it were permissible, as claimed by the lower Court, to group all of these claims together so as to cover a combination containing every one of the nineteen elements of the Double machine itself, even this hypothetical combination would not be infringed by the Wilson underreamer, which will be found to contain only five of those elements.

The fact that the Wilson underreamer does not contain a number of the elements essential to the

Double device and does contain several new and novel elements not contained in the Double underreamer makes of the Wilson underreamer a new combination, a new unitary structure, made up of a number of elements arranged together in a novel manner to perform a new and useful result, in fact, a completely novel underreamer organization. It is logical that a device cannot be held to infringe another combination unless all the elements of that combination are present in the alleged infringing device. If one or more elements of the combination are absent from a device certainly it cannot be contended that the combination is present in the device.

“We know of no authority where a defendant has been held as an infringer of a combination claim where he omits three of the elements of the combination. If the defendant omits one or more elements which make up the combination he no longer uses the combination. It is no answer to assert that the omitted elements are not essential and that the combination operates as well without as with them.” *Evans et al vs. Hall Printing Press Co.*, 223 Fed. 539.

The trial Court has observed that the Wilson reamer might be stripped of the Wilson novel features and be made over backwards into a Double reamer, thus reversing the rule of infringement. It is easy to trace back from success to failure, but it remained for Wilson to blaze the way ahead from failure to success.

Not only are the combinations of elements entirely different in the Wilson and the Double underreamers but their modes of operation have scarcely

any resemblance. It has already been pointed out that, in the Wilson underreamer, the cooperative interrelation between the pronged form of the bottom of the mandrel and the cutters with heads and shanks, permits of a mode of operation of the underreamer which had never been attained before and which the most expert mechanics and inventors in the art had striven vainly to obtain, viz., *that the portion of the mandrel which serves to spread the cutters when in reaming position SHALL NOT BE BETWEEN THE CUTTERS WHEN SAID CUTTERS ARE IN COLLAPSED POSITION.*

An examination of all previous underreamers will show that, where the spreading member is a fixed part of the mandrel, *this spreading member remains between the cutters when they are in collapsed position.* In the Double underreamer the spreading member is the web-like downward extension of the mandrel and it remains between the cutters at all times whether they are expanded or collapsed. In the Wilson underreamer the lower end of the mandrel terminates in two prongs or forks and the cutters, when expanded, bear against these forks; when collapsed, the heads of the cutters are below the ends of the prongs or forks and the cutter *shanks* collapse *between* these prongs or forks. The 'tilting' or 'teetering' action of the cutters of the Double device is due to the presence of the spreading member, or downward extension, between the cutters at the time of collapse. Such action is impossible in the Wilson underreamer

as there is no part of the mandrel between the cutters at the time of collapse upon which to 'tilt' or 'teeter.'

If the Wilson underreamer contained *all* of the elements of the Double underreamer but the *co-operative interrelation* of those elements had been changed so as to entirely change the *mode of operation* of the device, then the identity between the underreamers would no longer exist and this change of the mode of operation would negative infringement. This Court, speaking through your Honor Judge Gilbert, has so held in *Western Engineering & Construction Co. vs. Ridsen Iron & Locomotive Works*, 174 Fed. 224. In that case, notwithstanding the defendant's gold dredger contained *all* the elements of the claim charged to be infringed, there was no infringement because defendant had, in its dredger, changed the *co-operative interrelation* of such elements, thus changing the mode of operation of the device. There being no identity between the respective modes of operation, there was no identity between the two devices.

"If the device of the respondents shows a substantially different mode of operation, even though the result of the operation of the machine remains the same, infringement is avoided." *Cimiotti Unhairing Co. vs. American Fur Refining Co.*, 198 U. S. 414.

The following rule is also laid down in the same case:

"If, however, such changes of size, form or

location effect a change in the principle or mode of operation, such as breaks up the relation **and** co-operation of the parts, this results in such a change in the means as displaces the conception of the inventor and takes the new structure outside the patent."

"Identity in the idea of means subsists where the compared inventions perform the same functions *by the same modes of operation*. If the effects produced are substantially different, there is no identity. If the effects are the same and the functions are essentially different, there is no identity. *If the functions are the same and the modes of operation by which they are performed are radically unlike, there is no identity.*"—Robinson on Patents, Section 894.

"To make one mechanical device the equivalent of another, it must appear not only that it produces the same effect, but that such effect is produced by substantially the same mode of operation." 5 Bann. & A., 4. Walker on Patents, Section 353.

And this Double means of expansion and collapse necessitated the fatally weak cutter with its V-shaped notch to ride over the extension *always between the cutters*.

We will now describe the defects of the Double underreamer due to its construction and mode of operation and show how these were overcome in the Wilson underreamer because of its entirely unique construction and mode of operation. Such a comparison will emphasize their dissimilarities.

The Double underreamer had the defect that was common to all former underreamers,—*it was weak*

and frequently broke down because of the severe strain under which this class of tool must operate. Such breakages cannot be remedied by merely repairing the tool or replacing it by another for, when broken, the cutters of the underreamer are sometimes left in the hole and much time is wasted in the attempt to "fish" or remove them from the hole, or force them to one side or drill them up so as to permit the drilling to proceed. Many times holes are lost altogether if the broken portions of the underreamer cannot be removed or forced aside or drilled up. The first requisite in an underreamer is that it must not break and lose some of its parts in the drillhole. All underreamers previous to the advent of the Wilson device had this serious defect,—their construction was necessarily weak. (See testimony of Clay, Kinsey, Wrenn, Kibell, Bennett, Youngken, Griffin and nearly every driller. The record is full of it. All broken Double reamer parts in evidence. Not one such identified broken Wilson part is in evidence.)

In the Double underreamer, the slips have a narrow cutting edge and a narrow bearing upon the mandrel where the inward projections seat upon the opposite parallel bearing faces of the downward extension. This results in a tendency of the slips to vibrate sideways throwing a torsional strain upon the dovetails of the slips and the dovetail ways in the mandrel, which frequently tears out the dovetails and ways and permits the slips to become separated from the mandrel causing the serious troubles above

referred to. As these dovetail ways in the mandrel are downwardly and outwardly inclined, *they are weakest at the bottom where the torsional strain is heaviest and here they usually break out.*

The slips are held in the slipways by means of the key which is held in the spring-actuated rod only by the recess in the key and the tension of the spring. Sometimes this key breaks or becomes unseated and, in either event, the loss of the cutters in the hole is inevitable.

The downward motion of the slips and the spring-actuated rod is limited by the lower end of *the slot in the downward extension in which the key plays.* The pounding of the key on the bottom of this slot usually elongates the slot until it breaks through the bottom of the downward extension with the resulting loss of the cutters in the drill-hole. This can be avoided in the Double device only by discarding it before the wearing of the slot becomes serious.

The slips and the downward extension rapidly wear out where the inward projections of the slips bear upon the opposite parallel faces of the downward extension. When this wear becomes serious the underreamer has to be discarded. Attempts have been made to repair a mandrel, worn in this manner, by building up the worn faces with steel plates or "shims." The success of these attempts, however, has not been encouraging, as drillers generally refuse to use a defective underreamer, as do the owners.

The design of the Double underreamer necessitates its being constructed with a "sub" or extra joint in the mandrel which can be unscrewed to permit of assembling and taking down the mechanism. This joint or "sub" is a weakness, in view of the fact that it sometimes unscrews while in operation causing the loss of the whole lower portion of the machine in the hole, with the results above pointed out.

The underreaming results of the machine are frequently unsatisfactory in that the narrow cutting edges of the slips permit the hole to become grooved, "rifled" or "keyseated," as it is termed by the drillers, leaving the hole unreamed so the casing cannot be forced down behind the underreamer. Also these narrow cutting edges rapidly become dull and worn thus requiring their frequent removal for sharpening.

In operation, the downward blow of any underreamer frequently causes the cutters to jam or wedge tightly in the hole. When pulled out by the return stroke of the walking-beam, the Double device, like many of its predecessors, *releases or collapses so suddenly* that the tool bounds upward, and this "bounding" or plunging motion, not being coincident with the motion of the drill string, counteracts the effectiveness of the drilling operation. The cutters are often broken at such times. The sudden release of the underreamer above referred to is due to the travel of the inward projection of the cutters on the parallel bearing faces of the downward ex-

tension, and when the bottom of this extension is reached the collapse is instantaneous and complete and at a time when the drill string is traveling most rapidly and under a very heavy tension.

The evidence in this case also shows that the Double underreamer does not collapse or close to the degree necessary to facilitate passing it down through the casing freely, nor is the expansion sufficient. This is fatal in an underreamer. (See testimony of Kinsey, Gray, Kibele.)

Right at this point, midway between consideration of the defects and inefficient features of the Double patented reamer and the novel and highly superior features of the Wilson reamer which fundamentally corrected the errors in the Double invention and in other underreamers we wish to point out certain further specific distinctions to be made between the Wilson and Double reamers, in order to anticipate the confusion which we are convinced will be created by counsel for appellee, judging by his past performances in this suit.

In the first place, appellant's counsel will attempt to convince your Honors that much that we have said about the trivial step in the art taken by Double is to be ignored because for some inscrutable reasons Double made a wonderful invention when his patent gives conclusive evidence to the contrary. But, fortunately, we have it from the lips of Double himself that his purported invention cannot be construed and accepted as anything more than one most specific

device in which, to take Double's own words, there must be present the hollow slotted extension 6 integral with the rest of the body 1, as one piece. See his testimony R. p.—as follows:

“The Under-reamer exhibit in June 1901 was my first invention. The reason I did not apply for patent on reamer No. 796,197 until I had applied for patent on No. 734,833 reamer was I had supposed after filing my first application that I had covered all the points in both applications, but Mr. Lyon suggested filing additional application to cover the removable end block features which were not covered in the first application. In other words, the claim in application in No. 734,833 did not cover all the parts of the first reamer I manufactured. Patent No. 734,833 would not cover some of the features of the first form. It would not cover the removable end block.

XQ. 247. By MR. BLAKESLEE: Well, please state a little more definitely, how you understood the removable hollow slotted extension would not be covered in the application or in the patent to issue on the application made, as filed?

A. Mr. Lyon had explained to me that was a different application, a different way of putting the block in, and suggested making the application, which I did.

XQ. 248. In other words, you understood that one patent was to be for the solidly attached hollow slotted extension, and the other was to be for the removable hollow slotted extension; is that correct?

A. Yes.”

If now, the Double invention, as Double says is true, is only for the integral hollow slotted extension

6, or is necessarily limited to that feature, how can the Wilson underreamer which has no hollow slotted extension, either fixed or detachable, be an infringement of the Double patent?

The witness Griffin, who insisted that the Wilson reamer has both a hollow and a slot in its body extension, was asked to make a sketch showing the same, one in red ink and one in black ink. Counsel for appellee rushed to his assistance and refused to permit the witness to tell the truth about this on paper, by a mixture of red and black inks which would be the only way in which the single open space between the prongs of the Wilson reamer could be illustrated responsive to our request.

The trial court found that Wilson had merely subdivided the extension 6 of the Double patent into two parts, namely, the prongs. While it is undoubtedly the law, that making over a device originally having a single construction into a two part construction, and vice versa, *where no additional function, advantage or feature is obtained or produced*, does not in many cases involve invention, such law does not apply where, as in the case of the Wilson invention, such change results in total reorganization as it does in the Wilson reamer, for the many reasons herein pointed out.

A further point to be made as to the radical departure in the Wilson reamer from and over the Double reamer, in addition to what has been said with regard to the novel provision of a shank with shoulders for the cutter, and lateral shoulders on the

body of the cutter with the bearing faces 4³ is that Wilson for the first time brought these bearing faces to be used with spreading bearings *down onto the body of the cutter*. The inwardly directed shoulders 18 of the Double cutters were very high above the cutting edge, so that an extreme leverage was produced in the cutter, tending to rip out the dovetails 9. Wilson brought them down close to the working end of the cutter, and greatly reduced this destructive leverage action, in addition to extending them laterally instead of inwardly, and causing them to co-operate with lateral spreading bearings 9, so as to prevent the equally dangerous rotatory action, likewise producing a greater cutting edge and providing more stock in the body of the cutter for use in dressing out or sharpening the cutter, and producing a massive cutter body not suggested in the Double reamer, and better able to withstand the abrasive contact with the walls of the hole. Thus we see how thoroughly Wilson re-organized the underreamer cutter, as well as the body and extension of the reamer, the cutter suspending means, and the spring seat, not merely developing the art along the faulty lines pursued by Double, but striking out into new and hitherto unexploited mechanical territory.

In this connection see the logical and incontrovertible testimony of the patentee Wilson at R. pp. 157-159, as follows:

“Another marked difference between the two reamers is the position of these expanding or spreading-bearings for the cutters, in relation to the retaining shoulders on the reamer body, or dovetails, as they are commonly termed. The

Wilson underreamer is so constructed that these spreading-bearings project downward a very considerable distance below these dovetail shoulders. Thus, [140] the cutters are braced, down close toward the lower end, at which point of the cutters the greatest strain is applied, namely, the strain which tends to crush the cutters inwardly as they are being used or as they are reaming in a hole. The hole has a tendency to form into a funnel-shape, thus constantly crushing the cutters toward each other. That is the reason why it is necessary to have the cutters firmly braced apart by means of some form of a spreading-bearing while the cutters and the reamer are in operation. Otherwise this inward thrust or strain on the cutters would have a tendency to keep them almost constantly collapsed so that they would not enlarge the hole to the size required. And, as previously stated, the projecting ends or spreading-bearings on the ends of the prongs of the Wilson underreamer body extend downwardly to a point where this strain above referred to is taken up at the strongest portion of the underreamer cutter and allows the strain to have a very short leverage against the cutter. This leverage, in most instances, with the Wilson underreamer is probably not more than one and one-half to two inches, while the leverage with the Double underreamer applied against the cutter is, in most instances, from four to five and sometimes six inches. Thus, the strain applied to a Double cutter, owing to the increased leverage on same, is probably twice if not three times as great as the same strain would be on the Wilson underreamer cutter. And this is due to the fact that with the Double underreamer this spreading-bearing does not project below the dovetails or retaining shoulders on the reamer body; in other words, the lower end of their spreading-bearing is virtually flush with the lower ends of the re-

taining shoulders or dovetails of the Double body. This feature, alone, is one of the very great advantages we claim for the Wilson underreamer and is one of the reasons why there are so very few Wilson underreamer cutters that are ever bent or broken."

Further, in this connection and discussing the radically novel Wilson cutters, we wish to quote the indisputable testimony of the expert Wilson with regard to the absence of any tilting in the collapsing and expanding action thereof, and the radical difference between the functions and office of the Double dovetail ways 9, and the Wilson parallel ways 3. See R. pp. 262, 263.

"With the Wilson underreamer the dovetails of the body control the pivotal point of the cutters so that the upper end of the cutters at the fulcrum point cannot swing outwardly or inwardly as the cutter collapses or expands. This is due to the fact that the Wilson underreamer cutters travel in parallel dovetails.

"The Wilson underreamer is the only one the dovetails of which are solely for the purpose of holding the cutters in the reamer body. With the Swan and Double underreamers the dovetailed on the reamer body perform a dual function, namely, retaining means and also expansion means."

This one radical structural difference alone is sufficient in and by itself to avoid the charge of infringement in this case, as it necessitates a mode of operation in the Wilson underreamer completely at variance with that of the Double patent, and prevents, in fact, an operation of the Wilson underreamer inclusive of any tilting action of the cutters

whatsoever. At times, alleged infringing devices are *capable* under changed conditions of operating in accordance with the principle of the patent sued under. Then infringement becomes, as in *Wright Co. v. Curtiss*, 204 Fed., a possibility. But where the structural organization rigidly prevents the possibility of any such mode of operation as that of the patented device, infringement is impossible.

To be read in connection with the chart appearing some pages above, and which chart points out that the Wilson reamer under the most liberal admissions can be found to include only five of the nineteen claimed parts and features of the Double patented reamer, we wish to briefly summarize the various features of the mode of operation of the patented Double reamer which the Wilson reamer does not contain or employ, and the operative features used in the Wilson reamer not found in the Double patent.

DOUBLE

Tilting cutters, collapsing and expanding over spreading bearings, always between cutters.

Does not use.

Cutters tilted by upwardly and inwardly inclined dovetails.

Does not use.

WILSON

Does not use.

Swinging cutters with no spreading - bearing between them when collapsed.

Does not use.

Cutters have initial collapsion and final expansion on inclined spreading and inthrust bearings 9.

DOUBLE

Does not use.

Expansion produced by inwardly directed shoulders No. 26 on cutters.

Cutter suspending rod and key, rod guided in hollow and key guided in slot 7 in extension 6.

Slot 7 in extension 6 limiting downward travel of cutters and rod.

Expanded cutters separated by continuous extension 6.

Does not use.

Does not use.

"V" shaped groove across backs of cutters to permit collapsion and cause expansion over hollow slotted extension.

WILSON

Lateral cutter shoulders co-acting with spaced spreading and intrust bearings preventing rotatory action.

Does not use.

Does not use.

Does not use.

Does not use.

Cutters between spaced prongs and supported by removable spring-seat permitting assembling at space between prongs.

Means for contacting with removable spring-seat, for limiting downward movement of cutter rod and cutters.

Does not use.

The slips or cutters in the Double device frequently break just above the inward projection. This permits a large portion of the cutter to fall down the hole causing the loss of the hole or the "fishing" and like difficulties above referred to. This weakness in the cutter is due to the fatal defect of the Double underreamer—THE SPREADING DEVICE REMAINS BETWEEN THE CUTTERS WHEN THEY ARE COLLAPSED. It is, therefore, necessary to cut this notch or recess out of the slips to permit them to collapse over the bottom of the downward extension. This notch or recess, which forms the upper face of the inward projection, causes a weakness in the cutter which can never be overcome in the Double reamer.

The Double reamer cannot be assembled without removing the "sub" and the convenience of assembling at the bottom as with the Wilson reamer, was not dreamed of by Double.

Many other unsatisfactory features of the Double underreamer could be mentioned here, but the fatal defects above pointed out will probably be sufficient to prove that it was not, as claimed by the appellee, the *last step* in the art, if any other proof of that fact were needed than that, with the advent of the Wilson underreamer, the appellee ceased the manufacture of the device covered by the patent in suit and has since manufactured underreamers following the teaching of the Wilson device, and which have been adjudged infringements of the Wilson patent.

It will now be shown how these defects of the Double underreamer and its predecessors were overcome in the Wilson invention, which provided new fixtures and combinations. That these defects were overcome in the Wilson underreamer so as to make of it a practically unbreakable tool and one that meets all the requirements of a successful underreamer is plainly shown by the testimony, given in this case, by many practical drillers who have used numerous types of underreamers.

At this point we quote the testimony of E. C. Wilson, the inventor, as follows (R. p. 140 et seq.):

“My first step toward the invention of the Wilson underreamer covered by the Wilson, underreamer patent was while I was with the Baker Iron Works, probably during the year 1902 or 1903. My acquaintance with oil-well men frequently led to conversations, discussions, of different tools in use, and there was a frequent reference to the need of a satisfactory underreamer. There was scarcely ever a reamer sent into our shop for repairs that did not lead to a suggestion by some driller or some superintendent that somebody should devise an underreamer which would stand up to the work. I took occasion to ask them what the faults were, and what the weaknesses were, and as at that time the Double underreamer was coming into use that reamer was probably referred to more often than any other. I was told that that underreamer’s cutters were too narrow, that they did not expand out to sufficient width to ream the hole large enough,

and that its narrow cutters had a tendency to "Key-way" the hole, as they termed it. They also said that the middle joint was objectionable, as several of the companies lost the lower half of the Double underreamer in the hole, and they considered that joint weak. They also stated that it was a hard matter to get the Double reamer down in the hole, that they had to tie the cutters together in order to do so, in many cases. And they also said that the cutters themselves were weak; that they bent in the shank, and frequently broke, and portions of the cutters were lost in the hole. They also told that the key and mandrel by which the cutters were suspended was a weak device and should be strengthened some way or other. I asked some of them what opportunity there would be for an invention in that line, and they said that they believed the field had not been exploited, that somebody would come along some time and devise the right kind of an underreamer. I was a poor boy and on a small salary, and it occurred to me that there was an opportunity to make some money, and I commenced to study underreamers and what the requirements were, and tried to devise new ideas and new arrangements, and, if possible, to overcome the faults. I presume [128] I worked on that underreamer for a year before it commenced to formulate itself into any definite shape. I had sketches and drawings in my pocket which I had worked on at odd times, and until, finally, it commenced to assume a certain definite form, and after I had satisfied myself that my design was about right, I made working drawings and studied them over very carefully. I laid

these drawings out to scale to see that I would have the right amount of expansion and the right amount of stock properly distributed to stand the strain. I finally had one made up, an embodiment of my design, at Baker Iron Works' Shop."

The Wilson underreamer, as has been pointed out heretofore, contains a forked or pronged mandrel *which permits the cutter shanks to collapse between these forks or prongs*. The cutters are made with a broad cutting head, and a *shank* which reaches upward to the point of suspension in the mandrel. The lateral shoulders with their faces 4³, of this cutting head, bear upon the prongs when in reaming position. In collapsed position the cutter head swings inward below the prongs and the shanks close together between the prongs. The lugs 2' feet on the prongs are the elements which hold the cutters apart when in reaming position, and it is to be noted that this spreading device *is between the cutters when they are in the reaming position, and that it is not between the cutters when they are collapsed*. This distinguishes both the "means" and the mode of operation of the Wilson underreamer from all other underreamers, in which the spreading member is a solid portion of the mandrel.

Here was one of those changes in an art which resulted in a mode of operation which was epoch-making. This new and novel design of mandrel and cutters eliminated all of the above-described difficulties common to the Double device and its prede-

cessors. By this stroke of genius Wilson converted failure into success and this has been the "last step" in the design of underreamers, within the Paper Bag case, 143 U. S.

Because of these novel features in construction, which are the basic features of the Wilson underreamer, it can be made of a strength unheard-of in any prior reamer. The testimony in this case made it plain that there are few if any instances within the knowledge of the technical experts and drillers where the cutters of a Wilson underreamer have been lost in the hole.

The broad cutting head of the Wilson cutter bears at its lateral shoulders on the spreading prongs or forks and this broad bearing eliminates the torsional strain which, in the Double device, breaks the slips or cutters out of the dovetail ways.

Also this design permits the use of straight retaining shoulders on the prongs instead of the upwardly and inwardly inclined dovetail ways on the body of the Double underreamer. Thus in the Wilson machine, not only is the torsional strain removed, but the method of holding the cutters in the mandrel is more substantial. It is unheard-of for the cutters of the Wilson underreamer to be torn out of their ways as it is attested by the experts in this case.

Besides eliminating the torsional strain on the cutters, the broad cutter head had a much wider cutting edge than the narrow slip of the Double

machine. This prevents the "rifling" or "key-seating" of the hole, and, as there is much less wear on this broad cutting edge, it does not have to be resharpened so frequently as the narrow slips of the Double device, and there is more stock in the cutter to dress out on resharpening.

The elimination of the torsional stresses and giving the cutter heads broad bearings on the forks or prongs prevents the wearing out of the spreading bearings, which is a serious feature of the Double underreamer as to its one bearing. Also, as it is unnecessary to make room in the cutters for the spreading device when the cutters are in collapsed position, the cutters can be made of greatly increased strength. *In other words, no notch or recess is necessary* so as to leave *an inward projection on the inner face* of the cutter. The Wilson cutters have no "inward projection." The shoulders face inwardly, but do actually recede from the inner face of the cutter. The omission of this notch and the elimination of the torsional strain on the cutter results in a cutter strength which heretofore has been impossible in underreamers.

The defect, inherent in the Double underreamer, due to the pounding of the key on the bottom of the slot and the frequent breaking of the slot through the bottom of the downward extension, is not found in the Wilson device because Wilson does not use key, slot nor downward slotted extension.

In the Wilson underreamer, the cutter bearings on the prongs or forks are downwardly and inwardly inclined. This simple feature eliminates the “plunging” which is a serious detriment to the operation of the Double underreamer. In the Wilson device, if the cutters jam or stick in the hole, the instant the drill tools are pulled upward the cutters begin to collapse by reason of the cutter-bearings moving down the downwardly and inwardly inclined bearing faces on the prongs. This immediate collapse causes the cutters to be loosened while the drill string is only beginning to move, with the result that the drill string does not “bound” or “plunge”. In the Double machine, when the upward pull comes on the underreamer, the cutters move a long distance on the opposite parallel bearing faces of the downward extension till they are able to suddenly collapse over the end of this downward extension at a time when the upward pull on the underreamer has become very violent. The sudden releasing of the cutters causes the upward “bound” or “plunging”. The **elimination** of the plunging evil contributes in no small measure to the success of the Wilson underreamer and this feature was misunderstood by the lower Court as is evidenced by the following statement from its decision:—

“The feature of the ‘opposite parallel bearing faces’ (of the Double underreamer) ‘is only included in claims 1 and 2 and does not appear in claim 3. The opposite bearing faces 9 upon the prongs of the Wilson device are the equiv-

alent of the opposite parallel bearing faces in claims 1 and 2 of the patent in suit. It is true that the former are not exactly parallel, but they are approximately so *and could be made so without affecting, materially the function discharged by them.*"

The forked or pronged design of the Wilson mandrel makes it possible to assemble the Wilson underreamer from the bottom and dispense with the "sub" or extra joint in the mandrel, which is a highly detrimental feature of the Double and many previous underreamers. This is accomplished by the use of the "cross" or "tee", instead of the removable key as in the Double design, and the removable spring seat in the mandrel which is original with the Wilson device. Incidentally, it should be mentioned, that the use of this solid "cross" or "tee" prevents the possibility of the loss of the cutters in the hole so frequent with the failure of the key in the Double design.

Finally the form of the Wilson mandrel is such that, if any of the parts of the prongs or forks become injured or worn, the old prongs can be cut back and the bottom of the mandrel can be remachined, thus making a new mandrel of an old one. When a Double mandrel becomes worn or injured (and they are very short-lived), it must be discarded.

Almost any one of the above described novel features of the Wilson underreamer would have enabled the Wilson device to drive all other under-

reamers out of the market but, with all of these advantages over previous types of underreamers, the fact that this invention would prove to be the last and final step in the art became instantly apparent to everyone conversant with the underreamer problem. When the Wilson underreamer appeared on the market the appellee realized immediately that the Double underreamer, as described and illustrated in the patent in suit, would never be able to compete with so perfect a device as the Wilson underreamer and that the appellee's only possibility of remaining in the business of manufacturing underreamers depended upon promptly modifying the Double machine so as to include at least some of the valuable features of the Wilson device. This it did and has been found guilty of infringing the Wilson patent.

The most prominent novel feature of the Wilson underreamer is the design of its mandrel with its prongs or forks permitting the cutters to collapse completely between them. The Appellee could not adopt this design without making a Wilson underreamer. The next feature of prominence in the Wilson patent is the design of the cutters with shanks and broad cutting heads which permit of wide inthrust bearings on the mandrel, give greater cutting capacity, obviate the evil of "keyseating" or "rifling" of the hole, and eliminate the torsional strains which resulted in the breakages so common to the Double and all previous designs. Double saw that this feature could be incorporated into his

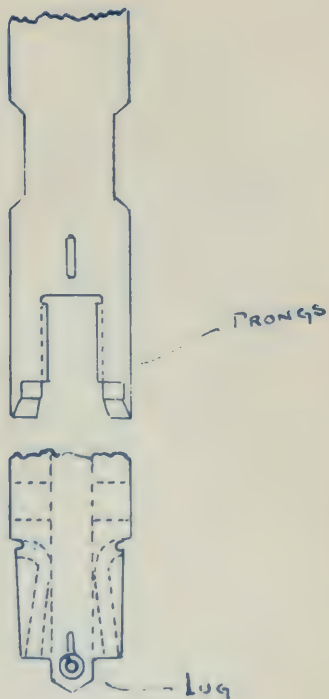
machine and he lost no time in doing so. He cut away the body on either side of the downward extension of his mandrel to make the broad seat for the cutter heads and then made his cutters with *bodies and shanks* in imitation of those features of the Wilson cutters which are covered by basic claims in the Wilson patent. Now the combination thus introduced in the Double reamers infringes claims of the Wilson patent.

Although this modification of the original Double underreamer did not have all of the objectionable features of the original type, as described by the patent in suit, it still had so many serious defects that it was unable to compete successfully with the Wilson device. The key-slot still wore out through the bottom of the downward extension. The in-thrust of the cutters still wore out the downward extension. It still was necessary to use the "sub" or extra joint as even this modification of the original Double underreamer could not be assembled from the bottom. Finally, the bottom of the mandrel could not be remachined when worn out. It was apparent that a still closer imitation of the Wilson device must be made if the Appellee was to continue in the manufacture of underreamers and this was accomplished in the Double Type F underreamer by cutting away the downward extension entirely and substituting, in its place, a block which is held in place by a bolt through the *prongs* or *forks* which are now formed on the bottom of the mandrel. It will now be seen that the bottom of the mandrel, in

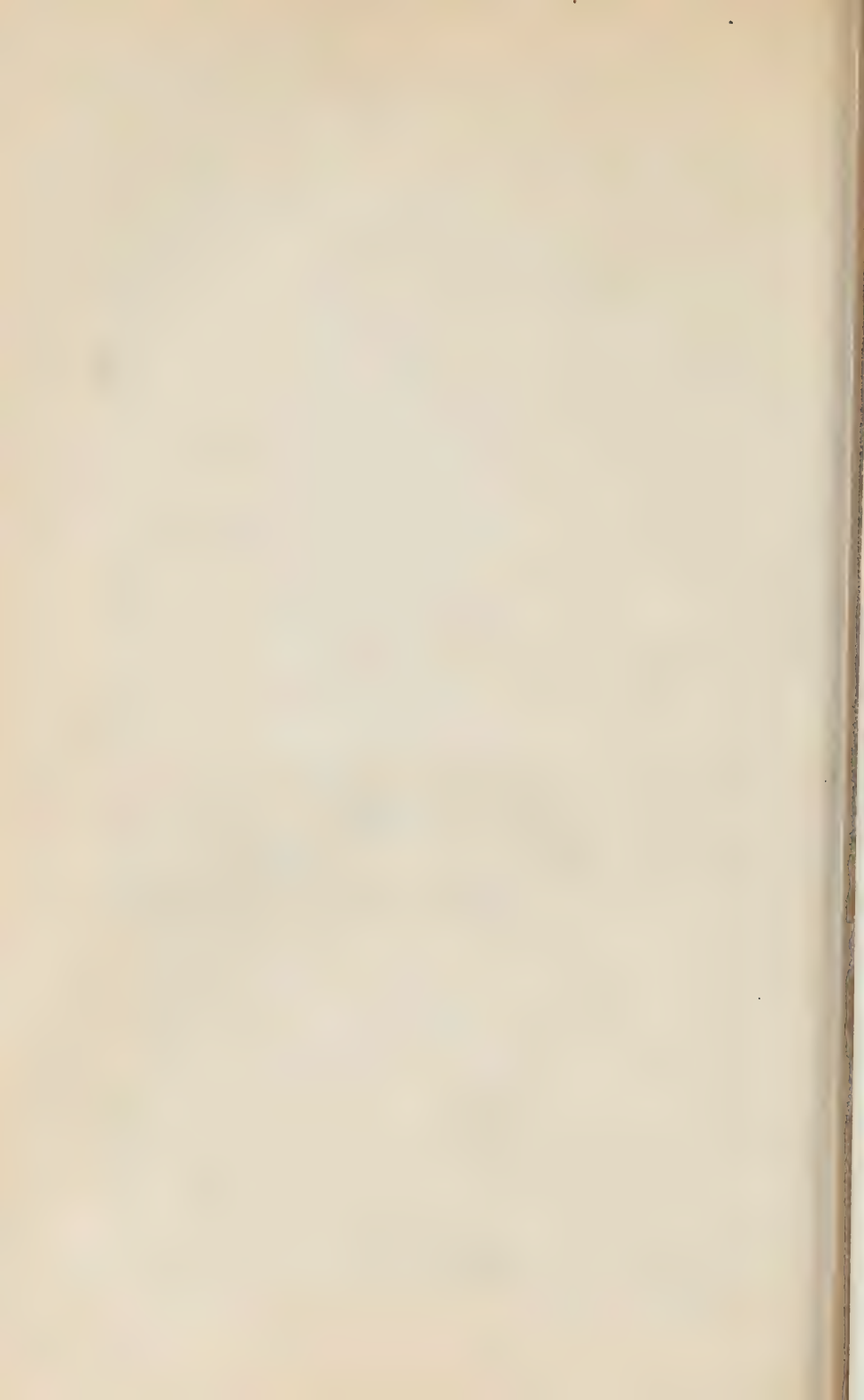
this "Double Type F" underreamer, has the prongs or forks terminating in lugs which is a distinctive feature of the Wilson underreamer and which is covered by basic claims in the Wilson patent, found infringed. In order to make the device an exact copy of the Wilson underreamer, the internal shoulder, which served as a spring seat in the mandrel, was now removed and the Wilson key was passed through the mandrel and a slotted cutter rod or tee to serve as a removable spring seat and thus permit of assembling the device from the bottom and dispensing with the "sub" or extra joint. It has already been explained that, at the time of adopting this Wilson key, Double and one Bole, who had long been an employee of Wilson's, applied for and were granted a patent on this Wilson key, Bole swearing that he had invented same. Wilson won this suit on appeal as will be seen in the citation previously referred to (227 Fed. 607), and a patent has since been issued to Wilson for the key combination, and a suit under same against Appellee is now pending.

Also, it has been pointed out heretofore, that in case 2996, tried with this case in the lower Court, all of these modifications of the original Double underreamer in suit, have been held to infringe the Wilson device. In his decision the lower Court rightly held as follows:—

"In the earlier Double devices there were secondary dovetails adjacent to the junction of the cutter head and shanks, with corresponding ways in the inner faces of the extension, forming



DOUBLE TYPE "F"



the recess in which the cutter is mounted on the body. These added ways caused an outward flare at the mouth of the recess, or pocket. As these ways were made deeper and the flare increased, a wider bearing would be given and opportunity for a wider faced cutter to bear upon it; but, *when defendant departed from this form of construction and entirely sheared away the side web of the extension to form a lug, the bearing faces to accommodate the wider cutter head, he appropriated the invention and conception of Wilson, and particularly of the patent in suit.* The fact that defendant did not appropriate the, perhaps, relatively more important conception of Wilson, whereby the cutter shanks were allowed to collapse between the prongs, does not excuse it, or take from the infringement it has practiced, for the seat or bearing of the cutter head on these faces, or lugs, is not dependent upon the swing in collapse of the cutter shanks between the prongs.”

It will now be seen that the point to be determined in this case is whether or not the designing by Wilson of the forked or pronged type of underreamer mandrel and the cutters with bodies and shanks to co-operate with lugs and ways on the mandrel so as to permit of having THE SPREADING PRONGS OR FORKS BETWEEN THE CUTTERS IN REAMING POSITION AND WITH NO SPREADING DEVICE BETWEEN THEM WHEN IN COLLAPSED POSITION; WITH THE CUTTERS COLLAPSING BETWEEN THESE PRONGS OR FORKS INSTEAD OF TILTING OVER THE SPREADING DEVICE; entitles Wilson to be considered an inventor, and his underreamer, to be regarded as an invention totally

distinct from the Double invention, or, if it is only an improvement dominated by the Double patent.

Here is one of those cases in which the history of patent litigation abounds, viz., where, after numberless attempts on the part of all the skilled inventors and mechanics in a craft, perfection is suddenly attained. Surely this marks the inventor. Double had his own and numerous previously-used underreamers in front of him and he failed to see this solution of the evils common to his and all previous designs of underreamers. The same may be said of Double's collaborator Jones, whom this evidence shows was a far more resourceful designer than Double and unquestionably invented the subject of the patent in suit. This brief is written under the extreme time limitations necessitated by the order made by your Honors setting this cause and cause No. 2918 for hearing on the same day, May 28, 1917, leaving Appellant only five days on this brief. We have only had a part of the proof of the printed record to make reference to, and for this further reason have not been able to make as extensive references to the testimony as would otherwise have been done. For the purposes of this opening brief, therefore, and in one further particular instance, we must invite your Honors' attention to the full testimony of the witnesses Double, Jones, Jones' wife, Haskett, Shaw, Richardson, Naugle and Skinner to support our contention that under no rule of law, on the facts presented, could Double be considered the *sole* inventor,

if even a joint inventor, of the subjects of the claim of the patent in suit.

The testimony referred to shows that before the date of the Double invention a model of the Brown reamer was seen and fully considered by Double; that a model of the Jones Round Nose Reamer was likewise known and examined by Double; that Double knew all about the Swan reamer; that Double probably knew about the O'Donnell and Willard reamer and likely about the Canadian reamer; and that Jones discussed these reamers with Double. So that as to anything in common as to these reamers and the Double reamer (and they meet every feature of the Double reamer except the notched cutter-carrying key), Double could *not* have been an original and independent inventor as required by statute. Jones was, as this testimony shows, the man who really designed the Double reamer of the patent in suit. He believed it belonged to Double as his employer—a fallacy that explains much on this issue of invention.

North, O'Donnell & Willard, Kellerman, Swan, and a host of others all had tried and failed when Wilson designed his pronged or forked mandrel with lugs and cutters with shouldered heads and shanks which permitted a co-operative interrelation resulting in a mode of operation which the Court in case 2918 describes as the, perhaps, "*relatively more important conception of Wilson, whereby the cutter shanks were allowed to collapse between the prongs.*"

If the most prominent designing and constructing engineers in the art failed to solve this problem after serious attempts to do so, the court must necessarily

conclude that more than the ordinary skill of the mechanic was required to solve it. Mr. Wilson, therefore, in creating as a solution of that problem, the pronged or forked mandrel with lugs and the cutters with shouldered heads and shanks, exercised his inventive faculties. It has been wisely said that this is the best test and proof the courts have for determining in any particular instance whether or not the inventive faculties were exercised in the creation of a "means for accomplishing an end."

"One criterion of invention is that others have sought and failed, even when the process is so simple, when discovered, that many believe they could have produced it if required."
Walker on Patents, Section 26.

Hanifen vs. Armitage, 117 Fed. 849.

This rule is strongly stated in the case of *Expanded Metal Co. vs. Bradford*, 214 U. S. 381, where the Supreme Court speaking through Mr. Justice Day, said:—

"It is often difficult to determine whether a given improvement is a mere mechanical advance, or the result of the exercise of the creative faculty amounting to a meritorious invention. *The fact that the invention seems simple after it is made does not determine the question*; if this were the rule many of the most beneficial patents would be stricken down. *It may be safely said that if those skilled in the mechanical arts are working in a given field and have failed after repeated efforts to discover a new and useful improvement, that he who first makes the discovery has done more than make the obvious improvement which would suggest itself to a mechanic skilled in the art, and is entitled to protection as an inventor.*"

See also *Loom Co. vs. Higgins*, 105 U. S.

Again in *Edison Electric L. Co. vs. Novelty Incandescent Lamp Co.*, 167 Fed. 982, it is said:—

“The fact is, as the record shows, dispelling any such idea, that not a few inventors, including Mr. Edison himself, had for some time been busied in the effort to secure a satisfactory arrangement of leading-in wires and *the different means taken for doing so, better than anything else, shows the complexity of the problem involved, and that in order to meet it something more than ordinary skill was required.* To deny its successful solution the merit of invention upon the contrary idea *is to declare these efforts were needless, and that there was already disclosed in the art an easy and obvious way out,* which ought to have been, but somehow was not, seen. We are not, however, to be persuaded to that view.”

The Appellee in this suit alleges that the Double underreamer was the last step in the art of designing underreamers, and that this same discarded Double device accomplished every beneficial result claimed for the Wilson underreamer; that the Wilson combination of elements is merely a shifting of mechanical equivalents and substitutes for the elements comprising the Double invention; that this shifting of mechanical means was obvious to Double and required only mechanical skill not amounting to inventive genius.

The same contention was made in the case of *St. Louis Street F. Mach. Co. vs. American Street F. Mach Co.*, 156 Fed. 567, and the facts in that case are so nearly identical with the case in suit that it will be quoted at considerable length:—

“There is no claim that any of the elements

of the patent are new. The tank, the water under pressure, the nozzle, the delivery apertures, and the means of adjustment are all old, but the contention is that the particular combination of these elements in the patent produces a new and useful result, and is patentable. The new and useful result claimed is the effective loosening up of dirt and material on the street and washing them off into the gutter by one action without injury to the street. To accomplish a new and useful result within the meaning of the patent law (Section 4886, Rev. St.—U. S. Comp. St., 1901, p. 3382—), it is not necessary that a result before unknown should be brought about, but *it is sufficient if an old result is accomplished in a new and more effective way*. If the value and effectiveness of a machine are substantially increased, the new combination of old elements, which does it, is patentable. *Loom Co. vs. Higgins*, 105 U. S. 580, 591, 26 L. Ed. 1177; *Cantrell vs. Wallick*, 117 U. S. 689, 694, 6 Sup. Ct. 970, 29 L. Ed. 1017; *Anderson vs. Collins*, 58 C. C. A. 669, 122 Fed. 451, and cases cited. The proof does not permit us to doubt that the machine of the patent does the work of scouring and flushing asphalt and other smooth streets in a more effective and satisfactory way than it was ever done before. . . .

“But it is contended that the device of the patent is only a mechanical shifting of existing means which does not involve invention, and that, if it did, it was anticipated by several other patents. The new and beneficial result accomplished by a device of the patent already referred to consisting of more effective and less injurious way of scouring and flushing streets might afford a sufficient answer to this contention; but there is more. The defendant company as found by the learned trial court and shown by abundant proof, upon being advised

of the features of the Ottofy invention, abandoned its old machine made according to the Murphy patent hereafter to be considered, and adopted the device of the Ottofy patent. Murphy, defendant's patentee, upon being advised of the defects in his machine and the objections made to it which Ottofy later remedied, confessed his inability to obviate them. Pickles, the engineer of defendant company, upon hearing of Ottofy's invention, claimed to be the first and original inventor thereof, applied for a patent therefor and assigned all rights to defendant. These are all significant admissions by experts, and that, too, against the interest of patentable novelty in complainant's device. *There is also evidence of more or less cogency that that device has superseded other devices* in the few cities which employ scouring and flushing machines in use upon smooth or asphalt streets. These facts are entitled to weight when the question is whether the machine exhibits patentable invention. *Keystone Mfg. Co. vs. Adams*, 151 U. S. 139, 14 Sup. Ct. 295, 38 L. Ed. 103; *National Hollow Brake Beam Co. vs. Interchangeable Brake Beam Co.*, 45 C. C. A. 544, 558, 106 Fed. 693, 707; *Kinlock Tel. Co. vs. Western Electric Co.*, 51 C. C. A. 362, 113 Fed. 652, 665. In *Krementz vs. S. Cottle Co.*, 148 U. S. 556, 560, 13 Sup. Ct. 719, 720, 37 L. Ed. 558, Mr. Justice Shiras, in delivering the opinion of the court, after referring to the contention that the step taken by the patentee was one obvious to any skilled mechanic says the contention is negatived by the conduct of defendant's president, which was in many respects like that of Murphy and Pickles. His language is:—

“ ‘The view of the court below that Krementz's step in the art was one obvious to any skilled mechanic is negatived by the conduct of Cottle, the president of the defendant company.

He was himself a patentee under letters granted April 16, 1878, for an improvement in the construction of collar and sleeve buttons, and put in evidence in this case. . . His improvement was to form a button of two pieces, the post and base forming one piece, and then soldering to the post the head of the button as the other piece. *Yet skilled as he was, and with his attention specially turned to the subject, he failed to see what Krementz afterwards saw,* that a button might be made of one continuous sheet of metal, wholly dispensing with solder, of an improved shape, of increased strength and requiring less material.' ”

These facts are so similar to the facts in the case at bar that we will again quote the most significant paragraph substituting in parenthesis the names of the parties in this case.

“The defendant company (Union Tool Company) as found by the learned trial court and shown by abundant proof, upon being advised of the features of the Ottofy (Wilson) invention, abandoned its old machine made according to the Murphy (Double) patent hereinafter to be considered, (Defendant’s Exhibit Double Underreamer) and adopted the device of the Ottofy (Wilson) patent. Murphy, (Double) defendant’s patentee, upon being advised of the defects in his machine and the objections made to it which Ottofy (Wilson) later remedied, confessed his inability to remedy them. Pickles, (Bole) the enginee of the defendant company, upon hearing of Ottofy’s (Wilson’s) invention, claimed to be the first and original inventor thereof, applied for patent therefor and assigned all rights to defendant (Double).”

Certainly it would be difficult to find two cases more nearly identical and the same ruling should

be applied to them. Notwithstanding the Appellee professes to believe that the Wilson underreamer is not an invention, Double gave it out as his opinion that it required the exercise of Bole's inventive faculties to add the relatively insignificant key feature to the Wilson device when he assisted Bole to patent it. If it constituted an inventive act to add to the Wilson underreamer this element, it certainly constituted an inventive act to create the Wilson underlying underreamer invention which rendered the Double underreamer obsolete long before Wilson invented this key which Bole and Double sought to appropriate.

No one of the numerous engineers skilled in the use and manufacture of underreamers ever designed an underreamer madrel with its lower end terminating in prongs or forks having lugs until Wilson conceived his invention.

“It seems to be conceded that the English structure can not be used as the Jeffrey structure is used without first making several important changes. The proof leaves no doubt on that subject. It is argued that these changes might have occurred to the skilled artisan. That they did not occur to anyone until Jeffrey made the invention is evident. They seem simple enough now but invention depended upon their being successfully wrought out. *In short, in these changes lies the difference between the commercial failure of the English patent and the widely recognized success of the patent at bar.*” *Gormully & J. Mfg. Co. vs. Stanley Cycle Mfg. Co. et al*, 90 Fed. 280.”

We submit that it cannot be denied that the conception and devising of the Wilson underreamer was the result of inventive genius of a high order and

that Wilson succeeded where all of the great designers and inventors of well-drilling appliances had failed. It is well established in law that the simplicity of a device may enhance, rather than detract from, the achievement of an inventor. Many of the greatest advances in numerous arts have been due to a change in an appliance of that art—a change so slight as to cause everyone to wonder why it had not been done before.

“It may seem a small thing, involving no great ingenuity, in an ordinary pipe coupling to merely make the spud of brass, beaving the other parts unchanged, but considering the efforts of others in the same direction and the various expedients resorted to, to obtain an easily detachable, and at the same time a steam and water tight joint, the simplicity of the device confirms rather than detracts from the invention, something more than ordinary mechanical skill being required to go so directly to the mark. Nor is it of any consequence that the well-known principle is made use of, that iron against brass will not rust. It is not necessary, in order to make out invention, that new qualities shall be evolved. It is sufficient if old ones are novelly and inventively applied.” *Western Tube Co. vs. Rinear*, 156 Fed. 52, affirmed (C. C. A.) 159 Fed. 431.

Again in *National Casting Co. vs. American Steel Foundries*, 182 Fed. 636, it is said:—

“Slight changes in appearance may bring about radical changes in results. Invention is not to be slighted because the changes are slight; neither is the inventor who makes his anti-creep feature more effective to be barred of his added invention because to his inventive brain the changes to bring about such result needed only to be few or slight in appearance. The doctrine

of mechanical suggestion or obviousness loses much of its force when invoked in such a case.”

The same idea is expressed in *Trost Co. vs. Cohn*, 119 Fed. 505:—

“It is this capacity for accomplishing results, this faculty of seeing what others fail to see and hearing what others fail to hear, which has always distinguished success from failure and the inventor from the mechanic.”

That the Wilson undereamer is not a mechanical improvement of the Double underreamer, but on the other hand, is an invention of rare merit in a generically different line of development, is conclusively proven by the fact that it was an immediate success commercially, and promptly displaced the Double device. This success has always been accepted by courts of law as the strongest evidence of invention. The evidence in this case shows that the success of the Wilson underreamer was so convincing from the moment of its appearance on the markets that it drove the Double underreamer out of competition and the Appellee immediately began the manufacture and sale of infringing devices.

“In determining this question (of invention), the fact that the article produced supersedes all other appliances, or that a useful and commercially successful result has been attained, or that the value of the thing patented has been recognized by the public in extensive use, has a controlling, if not a conclusive, effect; *and it should have, upon obvious principles of justice to one who sees that which he suggests or constantly appropriated and used by others.* Such is the proof in this case.” *Wilkins Shoe-Button Fastener Co. vs. Webb*, 89 Fed. 997.

This court has said in *Morton vs. Llewellyn et al*, 164 Fed. 693:

“Apart from the presumption of novelty that always attends the grant of a patent, the law is that when it is shown that a patented device has gone into general use and has superseded prior devices having the same general purpose, it is sufficient evidence of invention in a doubtful case.” *The Barbed Wire Patent*, 143 U. S. 275, 292, 12 Sup. Ct. 443, 36 L. Ed. 154; *Key-stone Manufacturing Company vs. Adams*, 151 U. S. 139, 143, 14 Sup. Ct. 295, 38 L. Ed. 103; *Irvine vs. Hasselman*, 97 Fed. 964, 38 C. C. A. 587; *Wilkins Shoe Button Co. vs. Webb*, (C. C.) 89 Fed. 982; *National Hollow B. B. Co. vs. Interchangeable B. B. Co.*, 106 Fed. 693, 707, 45 C. C. A. 544.”

The contention that the Wilson underreamer is not an invention but contains only such mechanical shifting of devices as would suggest themselves to a mechanic, as distinguished from an inventor, will probably not receive the serious consideration of this court. The fact that this simple and satisfactory solution of the underreamer problem did not so suggest itself to any of the great designers and inventors in the art until Wilson conceived his device, will at once negative this suggestion. Had this solution been obvious the mechanical eye of more than one of these inventors would have perceived it.

“The practised eye of an ordinary mechanic may be safely trusted to see what ought to be apparent to every one. As was said by Mr. Justice Bradley in *Loom Co. vs. Higgins*, 105 U. S. 580, 591:—

“‘Now that it has succeeded, it may seem very plain to anyone that he could have done

it as well. This is often the case with inventions of the greatest merit. It may be laid down as a general rule, though perhaps not an invariable one, that if a new combination and arrangement of known elements produces a new and beneficial result never attained before, it is evidence of invention.' " *Potts vs. Creager*, 155 U. S. 608.

In view of all of these facts and rules of law we do not perceive how any court could find, *as a fact*, that the Wilson design of underreamer is merely the work of a mechanic who has shifted the mechanical devices of the obsolete Double device and substituted some of them with obvious mechanical equivalence; that the discarded Double underreamer, as described by the patent in suit, was the "last step" in the art of underreamer design and this notwithstanding the Appellee's successor ceased its manufacture immediately when the Wilson underreamer appeared on the market and began the manufacture of imitations of the Wilson device which have now been adjudged to be infringements of it. If the Double patent in suit is a satisfactory underreamer and is the "last step" in the art, is incapable of improvement, we challenge the Appellee to explain why he does not revert to its manufacture instead of furnishing a heavy bond (\$25,000) to enable him to continue the manufacture of these copies of the Wilson underreamer pending the appeal from the decision in which the Appellee is declared to be infringing the Wilson patent.

It is apparent that in a case brought within the above rules defining what constitutes invention, as distinguished from mechanical ingenuity, the question of invention is a question of fact. It is not a

question of arbitrary opinion. The application of every known test of invention to the Wilson underreamer proves it to be an invention of great merit and of a design differentiating it from the fatally defective method of spreading the cutters by a division wall or "hollow slotted extension" common to the Double and numerous previous designs. The Appellee praises the prior art and follows Wilson. Wilson was the first to perceive that by forming the lower end of the mandrel into prongs or forks with lugs, and designing a cutter with a broad head and shouldered shanks, a co-operative inter-relation would result which would eliminate all of the evils common to the previous designs. It is now easy for the Appellee to contend that he saw this great possibility first. *It is easy to contend, but not possible for him to prove, that his obsolete underreamer actually contains the equivalent of these features!* And there are many others. In the design of his underreamer, Wilson exhibited in a marked degree "The capacity for accomplishing results, this faculty of seeing what others fail to see and hearing what others fail to hear which has always distinguished success from failure and the inventor from the mechanic."

"Here was a situation, say the defendants, where a hard unyielding substance had been tried and found wanting and where a soft and gripping substance was needed in its place. Rubber possessed all the required qualities and everyone knew it. What then was more natural than to use rubber? *This argument has been so often considered by the courts that little of value can be added to the discussion, and, after all, the old answer is the best answer,—'No one did it before.'* The record shows that for at least ten years prior to Gorton's invention men

skilled in the art were endeavoring to make an operative supporter and several had so far succeeded as to secure patents, but always along the same lines. There was always the metal button, there was always the fabric clamped between two metallic surfaces. Rubber, in almost every conceivable shape and form, was everywhere in use, but no one thought of it. Like a jewel lost in a crowded thoroughfare,—multitudes pass it unnoticed, some actually tread upon it, others stop and gaze for a moment, but hurry on, deeming it some worthless tinsel; at last comes one who recognizes its value and picks it up. Others might have done this it is true, but they did not; he did, and is entitled to the prize which he has rescued from the mire. If one should attempt to snatch the gem from the finder on the ground that he passed it frequently and could have picked it up as well as not, he would in all probability be promptly turned over to the police as a thief or a lunatic. *It is this capacity for accomplishing results, this faculty of seeing what others fail to see and hearing what others fail to hear which has always distinguished success from failure and the inventor from the mechanic.* ‘In the law of patents it is the last step that wins’, says the supreme court. This is the step which Gorton took.” *George Trost Co. vs. Cohn*, 112 Fed. 1009, affirmed (C. C. A.) 119 Fed. 505.

Wilson “succeeded where others failed.” He took the “step which marks the difference between a successfully operating machine and one that stops short of that point.” He “obtained absolute simplicity which is the highest trait of genius.” His underreamer “went into general use and superseded prior devices having the same purpose.” Wilson “took the last step”—the step that wins. He deserves the protection of the law which was framed

to protect the inventor as against a prior patentee who did not produce or patent what the later inventor did.

“If there be one central controlling purpose deducible from all these decisions, and many more that might be quoted, it is the steadfast determination of the Court to protect and reward the man who has done something which has actually advanced the condition of mankind, something by which the work of the world is done better and more expeditiously than it was before.” *Hobbs vs. Each*, 180 U. S. 383.

We submit that it cannot be doubted that the Appellant can rightfully claim the protection of that law.

Inasmuch as grave doubt exists as to whether the Double patent discloses and claims any invention at all over the prior art, and also as to whether Double himself created such invention, if any exists, we submit that a finding of infringement by this court would be contrary to the proofs and law, even if the alleged infringing reamers had been made in exact accordance with the drawings and specifications of the Double patent. It is, therefore, beyond the remotest realm of reason and application of law to facts that the totally dissimilar, radically better and Double-reamer-superseding patented Wilson reamer should be found an infringement of the subjects of the Double claims. To do so, would work in effect a revocation of the patent grant to Wilson and a substitution of the same for the patent to Double.

We have thus seen that the Wilson invention is one of great merit; that it has played an important

part in the great industry of oil development; that its construction and interrelation of parts is new and radically different from the Double reamer or any other reamer preceding it; that furthermore, it differs radically in its various principles of action and modes of operation; that it has overcome the many faults common to the Double reamer and all others and that it is covered by good and valid patents; Furthermore, we have seen that the Double reamer, which was a mere step in the art, was a very unsatisfactory device, and was promptly abandoned by the public and that the Appellee appropriated Wilson's inventions when constructing reamers thereafter; that the Double patent is necessarily limited in scope to the very narrow step of the Double invention; and that by no doctrine of patent law can it be so distorted and so abnormally extended in scope as to cover the Wilson reamer.

Therefore, we respectfully submit that it will be the desire of this Honorable Court to remedy the revolutionary effect of the decision of the lower Court, which decision if sustained would sweep away much of the soundest doctrines of patent law and establish that one can claim functions and results. The effect of narrow, combination claims would be given undreamed of scope; voluntary limitations would be set aside and new and unthought of monopolies would be granted regardless of the nature of the patent, irrespective of the rights of the public; difference of construction and interrelation of parts—different principles of action and different modes of operation would no longer be a defense against a charge of infringement of a combination patent; invention would be discouraged and the public

robbed of the protection heretofore granted it as to notice of what a patentee was claiming by his patent.

Such would be the result should your Honors affirm the decree of the lower Court.

We submit that such would be contrary to the established principles of patent law and a great injustice to a worthy inventor and to the public.

Hence, we confidently submit that it is proper for this Honorable Court to reverse the decree of the lower Court with direction that the Bill of Complaint be dismissed and the injunction dissolved.

Respectfully submitted.

RAYMOND IVES BLAKESLEE,
Solicitor and Counsel for Defendant-Appellant.

United States
Circuit Court of Appeals,
FOR THE NINTH CIRCUIT.

Wilson & Willard Manufactur-
ing Company,

Defendant and Appellant,

v.

Union Tool Company, Edward
Double, Rosa Eichenhofer, as
Administratrix of the Estate
of Friedrich Eichenhofer, De-
ceased, and George L. Chad-
derdon,

Complainants and Appellees.

APPELLEES' BRIEF.

FREDERICK S. LYON,
503-508 Merchants Trust Bldg., Los Angeles, Cal.,
Solicitor for Appellees.

Filed

MAY 28 1917

F. D. Monckton,
Clerk.

RE-FILED

NOV 26 1917

F. D. MONCKTON,
CLERK.



No. 2996.

United States
Circuit Court of Appeals,
FOR THE NINTH CIRCUIT.

Wilson & Willard Manufactur-
ing Company,

Defendant and Appellant,

vs.

Union Tool Company, Edward
Double, Rosa Eichenhofer, as
Administratrix of the Estate
of Friedrich Eichenhofer, De-
ceased, and George L. Chad-
derdon,

Complainants and Appellees.

APPELLEES' BRIEF.

This case comes before this court on an appeal, under section 129 of the Judicial Code, from an interlocutory decree awarding an injunction prohibiting defendant from further infringing the Double patent, number 734,833, granted July 28th, 1903, by manufacturing and selling the so-called Wilson and Wilson Improved underreamers.

The suit was heard in the United States District Court for the Southern District of California, Hon. Edward E. Cushman, United States District Judge for the Western District of Washington, presiding by special designation.

The bill of complaint was filed in February, 1910. Defendant duly answered. After the case had been at issue the present counsel for appellant was retained on behalf of defendant. Proofs were taken on behalf of complainant, under old Equity Rule 67, in deposition form. After the completion of complainants' *prima facie* proofs, defendant (on January 20, 1913) amended its answer, filing a substitute answer. [Record pp. 18-43.] The original answer does not appear in the transcript. The testimony and proofs were proceeded with in deposition form under the practice of old Equity Rule 67 and were completed in February, 1913. From that time until the July, 1915, term of the court the case awaited a final hearing. Due to the congested condition of the trial calendar and to defendant's insistence that it would require at least two or three weeks to hear and dispose of the final hearing, His Honor, Judge Olin Wellborn, continued the case from term to term, until in July, 1915, it was set for final hearing in September, 1915, by His Honor, Judge Benjamin F. Bledsoe.

On August 20, 1915, defendant moved for leave to file another amendment to its answer. This motion was accompanied by a motion to continue the final hearing, striking the case from the trial calendar, and to allow the defendant three months within which to take proofs. The motion to amend was granted on

terms, one of the conditions of which was that the defendant should produce its witnesses in open court to substantiate the allegations of its amendment. The final hearing was continued.

While this final amendment does not appear in the transcript of record on appeal it was called for by the praecipe filed by appellant and complainants will not object to its being considered as before the court and to this end quote such amendment as follows [the insertion being just before the word "Wherefore," page 43 of the printed record]:

"First: That the complainant, Edward Double, patentee of letters patent No. 734,833, sued under herein, surreptitiously or unjustly obtained the patent for that which was in fact invented by another, Frederick W. Jones, then at Santa Paula, county of Ventura, California, and now of McFarland, county of Kern, California, who was using reasonable diligence in adapting and perfecting the same."

"Second: That said Edward Double was not the original and first inventor or discoverer of any material and substantial part of the thing patented, but that he obtained his knowledge and information of said alleged invention from said Frederick W. Jones, and from one J. S. Brown, patentee of U. S. letters patent No. 687,296."

"Third: That said alleged invention of said Double patent in suit herein had been described in a printed publication prior to his supposed invention or discovery thereof, more than two years prior to his application for said patent therefor, to-wit, in a catalogue of the Oil Well Supply Company, Ltd., of Petrolia, Canada, published and

circulated at Petrolia, province of Ontario, Canada, in the year 1896.”

“Fourth: That as a further defense, said defenses of said immediately prior paragraphs first, second and third being likewise separate defenses alternatively presented, the complainant, Edward Double, patentee of letters patent No. 734,833, sued under herein, had personal notice and knowledge of said Swan U. S. letters patent No. 683,352, and of the Swan underreamer made and used substantially in accordance with said Swan patent, and of an underreamer made substantially in accordance with said Brown U. S. letters patent No. 687,296, and of said catalogue of said Oil Well Supply Company, Ltd., of said Petrolia, Canada, and of said catalogue of said Oil Well Supply Company, of said Pittsburgh, Pennsylvania, and particularly of said underreamer shown in Fig. 2161 of said last named catalogue, all prior to the date of the alleged invention by said Edward Double of said letters patent No. 734,833 sued under herein.”

If this amendment is not to be considered as before this court and as a part of the transcript of record herein, all of the testimony of the witnesses taken in open court must be excluded from consideration, as incompetent and inadmissible under the pleadings.

On February 24, 1916, this case was called for trial and final hearing. The court heard the testimony of Frederick W. Jones and others produced on behalf of defendant as its effort to maintain the four new defenses thus interposed, and also heard the testimony of Mr. Double and others produced on behalf of complainants. The printed transcript of record [from page

877 to 1010] contains a condensed narrative statement of such testimony so given in open court. The conflicting testimony of these witnesses was duly weighed by the court. The trial judge had the witnesses before him and could judge of them and of their demeanor on the stand, their frankness and their apparent credibility, etc. After hearing this testimony the trial court found these new defenses not sustained by the evidence. It is a general rule of this court that under such circumstances this court will not review such findings of fact nor disturb the decision of the lower court based thereon.

The Circuit Court of Appeals for the Seventh Circuit, in *American Rotary Valve Co. v. Moorhead*, 226 Fed. 202, 203, says:

“If the witnesses have been heard in open court, one element which rightly enters into the reviewing court’s consideration of the evidence *de novo* is the opportunity of the trial judge to estimate the credibility of the witnesses by their appearance and demeanor on the stand. *Espenschied v. Baum*, 115 Fed. 793.”

242 U.S. 350-353

In *Adamson v. Gilland*, 37 Sup. Ct. Rep. 169,^Λ the court says:

“The case is pre-eminently one for the application of the practical rule that so far as the finding of the master or judge *who saw the witnesses* ‘depends upon conflicting testimony or upon the credibility of witnesses, or so far as there is any testimony consistent with the finding,’ it must be treated as unassailable.”

Yet these defenses appear to be the ones most relied upon by defendant on this appeal. Another important consideration should be pointed out in connection with the "Fourth" allegation of this amendment. It shows the change of position taken by defendant and that defendant's counsel originally was of the opinion that the Brown patent was not anticipatory of the Double invention and was not material. In this defendant's counsel seems to have been of the same opinion as Judge Cushman.

In defendant's original answer the patent to Jacob S. Brown No. 687,296 was pleaded as anticipatory of the Double invention. After complainant's *prima facie* proofs had been completed, and after the greater part of defendant's proofs had been taken, the substitute or amended answer (appearing in the transcript of record) was filed. *Defendant's present counsel deliberately cancelled and omitted the Brown patent from such amended answer, clearly indicating that he considered it was not a defense and that it was not material.* (If this is denied we will ask the court for a writ of *certiorari* for diminution of the record to bring up the original answer. It was called for by the praecipe filed by appellant [Record p. 1037], and it should be here. It is a part of the record in this case. Complainants, however, anticipate there will be no denial of this statement.) Doubtless both defendant's counsel and experts considered this Brown patent a mere paper theory, incapable of embodiment in an actual operative or successful device. All who have testified regarding it have so testified. *Not one witness in this case has*

ventured to even intimate that an operative or successful tool could be built according to this Brown patent.

Drilling Oil Wells.

There are two well known methods or systems of drilling oil wells. The first of these is commonly known as the "standard" or "cable tool" system. The second is the "rotary" or "rotary hydraulic" system. A third is known as the "Canadian pole system." The devices to be considered in this case have nothing whatever to do with the rotary or rotary hydraulic system.

The "standard" or "cable tool" system consists essentially of a high derrick, with windlasses or drums, commonly called "bull" wheels and "calf" or "casing" wheels for winding up and playing out the ropes or cables to which the tools and pipe or casing are respectively attached. The well hole is drilled into the ground by the drop of the string of tools. In order to start a well hole by this system of drilling the hole is started by what is termed "spudding in." This operation has nothing to do with underreaming and needs no particular explanation.

Ordinarily in this standard system of drilling the well hole is partially filled with water so that the earth is softened and the drillings or detritus churned up into a mud, this mud being removed from the well hole by a sand pump or bailer. In the derrick a walking beam or reciprocating beam is provided and to one end of this reciprocating beam the cable or rope, which carries the string of tools down into the well, is attached. The reciprocation of this walking beam re-

ciprocates the tools up and down into the well hole, drilling the hole.

In drilling oil wells in Pennsylvania, as the evidence shows, no underreaming was necessary. The reason was that the formation there was substantially a rock formation which stood up and had no tendency to cave in. With such formation it was only necessary to case in the well hole with pipe down to the rock formation. This, as the evidence shows, was anywhere from fifty to one hundred feet. After that no casing whatever was required and oil wells drilled in that territory were completed without casing.

In California drilling, however, the formation is alternately hard and soft and it is necessary to case the well with pipe in order to prevent the walls of the hole caving.

It is thus seen that with this standard or cable tool system the drilling must be accomplished by passing the string of tools with the drilling bit at the end thereof through the pipe or casing. This bit must be of such size that it will readily pass through the inside of the pipe. It follows, therefore, that unless the formation is very soft the reciprocation of this drilling bit up and down in the well hole will cut a hole of smaller diameter than the outside diameter of the pipe or casing. When, therefore, a hard strata, rock or a projecting boulder is reached, it is necessary that the hole therethrough and underneath the casing be reamed out to such a diameter that the casing may follow through the hole. This is termed "underreaming,"—that is to say, reaming out the hole under the casing so that the casing may follow down. A device for this

purpose is called an underreamer, and is, in effect, an expansion bit so constructed that after it has been dropped down through the casing its cutting devices will expand out so as to cut a hole of a diameter larger than the casing.

Ordinarily in underreaming the well casing is held up a suitable distance above the bottom of the hole or above the ledge or hard strata, rock or boulder through which the hole is to be underreamed so that the string of tools with the underreamer thereon may have sufficient drop to crack off the parts of this ledge and thereby enlarge the hole. The drilling bit, of course, has been used to drill the hole through this ledge, rock or projecting boulder, but such hole is ordinarily of too small a diameter to permit the well casing to follow down.

The object of such casing in the standard or cable tool system of drilling is two-fold.' Its first object is to prevent cave-ins due to the soft formation or to water or other causes. However, often streams of water are encountered and the bore of the well must be diminished to shut off the water flowing into the well. To do this, the given casing is anchored just below the water strata and another string of casing, of such diameter as to freely slide down inside the first named casing, is extended down therethrough, shutting off the flow of water into the inner casing. Often, either due to the difficulty of drilling through hard formations, or to the "freezing" of the casing (that is, the casing becoming immovable), or due to water, a well hole is reduced by several different sizes of casings before it is finished.

As the evidence in this case shows, prior to the advent of the Double underreamer of the patent in suit, oil wells in California ordinarily could only be drilled to a depth not to exceed fifteen hundred feet. The evidence shows that if it had not been for the production of a truly successful underreamer the various great oil fields of California would have been unknown, for it has only been through the very deep wells that the most prolific territory has been developed.

Complainants in this case do not pretend that the Double underreamer was the very first underreamer that ever underreamed a well, in the sense that it was the very first device, *but it was the first completely successful device, and the evidence shows that it entirely superseded all of the tools that went before it.* The evidence also shows that the sales of the Double type of underreamer amount to over 85% of the sales of all underreamers since its advent in the field. This statement must be considered in two aspects. First: As to the time from the first production of the Double underreamer to the date of the advent of the infringing Wilson underreamer. During that period (1901 to 1905) the Double reamers manufactured by the Union Oil Tool Company had the California trade entirely to themselves. Nothing else was being used except sporadically. Second: As to the time after the Wilson infringement commenced. During this period practically no other reamers have been sold or used.

The evidence in this case clearly demonstrates that there was no really successful underreamer prior to the Double reamer. This fact is of extreme weight in this case. It is to be considered in connection with the fact

that defendant's answer sets up seventeen (17) prior patents granted for underreamers, as well as referring to four or five other makeshift devices as to which prior use is alleged. All of these are proven to have been substantially failures. The Double type of reamer has supplanted them all.

"If there be one central controlling purpose deducible from all these decisions, and many more that might be quoted, it is the steadfast determination of the court to protect and reward the man who has done something which has actually advanced the condition of mankind, something by which the work of the world is done better and more expeditiously than it was before."

See Hobbs v. Beach, 180 U. S. 383.
O'Rourke Co. vs. McMullin 160 Fed. 933 at page 938

"The fact that the article produced supersedes all other appliances, or that a useful and commercial successful result, has been attained, or that the value of the thing patented has been recognized by the public in extensive use, has a controlling, if not conclusive effect; and it should have, upon obvious principles of justice to one who sees that which he suggests constantly appropriated ^{and used} by others."

Wilkins Shoe Button Fastener Co. v. Webb, 89
Fed. ~~996~~ 982, at page 997

The testimony in this case is conclusive of the extreme merit of the Double invention. It may be illustrated by the following:

S. F. Peet, testifying in 1912, says he is and has been the manager of the oil well supply department of the Fairbanks-Morse Company; he says:

"After the Double underreamer came out we sold practically nothing else up to the time the Wilson reamer came out. The Double reamer was more practical and efficient than anything in use prior to that time. * * * The percentage of the Double underreamer (sold) is very large. I can't say exactly. I believe at least 90 to 95%. Prior to the advent of the Double underreamer we had frequent orders for the Austrian, but not for the Leidecker or North. The Austrian was the principal one sold. It was very unsatisfactory, *and prior to the advent of the Double underreamer there was a demand for a reamer.* We sold a few North reamers. They were not satisfactory." [Record pp. 118-119.]

Chas. P. Barnes, vice-president and manager of the California National Supply Co., having stores in all the oil fields, testifies:

"We sell Double and Wilson underreamers mostly. Sold Double underreamers very largely for the last ten years. During the last two years think we have sold about two hundred Double underreamers and six or eight Wilson underreamers. To a small extent we sold Austrian underreamers prior to the advent of the Wilson underreamer. We also sold Double underreamers before the advent of the Wilson reamer. We did not handle the Austrian reamer very extensively because it did not fill our requirements in California. *When the Double first came out it supplanted the Austrian altogether. Since then we have never sold one Austrian to my knowledge.* The Austrian reamers did ream after a fashion. *They were a failure in California oil fields.*" [Record pp. 117-118.]

Edward Double, one of the complainants, the inventor of the Double reamer, and president of the Union Oil Tool Company, testifies:

“I was living in Santa Paula at the time I invented the Double underreamer. The Union Oil Company, a large customer of our concern at that time, was using Austrian underreamers exclusively for their work, and Mr. Lyman Stewart of that company suggested *that there would be a fortune for someone who could invent a successful underreamer*. That was really the starting point of the underreamer.”

William E. Youle testifies he is 65 years old; occupation, drilling oil wells; residence, Los Angeles since 1877.

“Prior to 1877 I resided in the Pennsylvania oil fields, was engaged in drilling oil wells there from 1863 to 1876: I have continued connected with drilling oil wells in California for about thirty-two years. The first California oil field I drilled in was Newhall. The next was Moody Gulch, Santa Clara county. Next, back to Newhall. Next, to Puente—opened up the Puente. Eleven years in the Kern county fields—opened up the first wells there. Then drilled north in Colusa county—two or three years there wild-catting deep wells. Back to San Luis Obispo county—deep wells there. Three years ago I graduated, after thirty-five or thirty-six years in the business.

By ‘wild-catting’ I mean looking out territory first, with a view of ascertaining the probabilities, the ear-marks that you could see, and making up your mind whether you would be justified in trying for oil. Subsequently, after more investigation,

you make up your mind to drill a well. In fact, the Newhall field, the Puente field and the Kern River field were all due to my first efforts.

I have had a whole lot of experience with underreamers. My first experience with underreamers—I have tried a good many—were not successful. The first tool that I ever saw and used was an underreamer with a cutter on one side with a spring attached to it to throw it up under the pipe. That was in about 1882. The next thing I saw was a bit, split in the middle, with a tapering wedge, that when it hit the bottom it would expand the bit the full size of the hole. It looked all right. The trouble we had with that was the stem that threw the wedge open, when it hit the bottom, would break the tool off and we could not get the tool out. The trouble with the one-sided arrangement was it would come down the wall here and strike a hard streak and it wouldn't hardly touch it but would glance back, and then come to a soft streak and it would cut a great hole in the side of it; and that would make a straight hole crooked—that is, the reamed part of it would be crooked, due to the fact that the one-sided arrangement would not cut out where you wanted. That was a failure. The bit was a failure in consequence of the liability of the stem that was to shove the wedge down after it came to the bottom—the stem would hit the shoe and push the wedge down, and break, and we could not get the tool out. And sometimes that would get balled up with mud. All drillers know what that means. It gets so you can hardly cut it off with a chisel. It would hold the stem rigid and in trying to get it through you would break it off, maybe. We had that trouble. Well, that didn't work, and the

one-sided reamer didn't work. Now, I think, the next one, I got a Leidecker in West Virginia. There was one of those shipped out here—I think I used the first one—by McFee, the McFee Supply Company, and he wanted me to use it or try it. Well, it seemed to start off pretty well; *but we got into hard rock and we could not get the pipe to follow.* The trouble with that reamer was the clearance was too large, and it had the same proposition of a wave in reaming that the others had. Well, I got pretty near disgusted with under-reamers. But I bought another one. A man by the name of Mentry invented one. It had two legs, with a knuckle at the bottom, and spring attached to the knuckle so as to throw it up until it reached under the pipe and then the spring released it and expanded it. And I bought that just complimentary to Mr. Mentry. I didn't use it; but I loaned it to a fellow at \$5.00 a day, and he fished for it for three months and he never got it out of that hole. That was a reamer that I never used. By 'fishing' I mean: He put it down without a heavy sinker run it light—and it was like a hollow-reamer. It was the worst thing that was ever put in a hole. And he got down into that hole with it unexpanded, into a place that caved out big enough for the reamer to expand, and I am a son of a gun if you could get it back, because it would not hit the pipe, you know. It went down unexpanded too low; got into a place that it shelved off, and big enough to expand, and damned if he could get it out. He could not ream out above it, and there he was. He finally jarred off the neck of it and left it in the hole, and he fished for it about three months. When I say 'fished' I refer to a tool being lost in a hole. The

reason I forgot to state about that one, I never used that. But that was a reamer that I did have. Well, then I think the next one that I used—I didn't use that myself, but I had a crew use it for a little while. This reamer was an Austrian underreamer. Well, the boys used that, but we could not get the pipe to follow it. Now, you see in that Sunset field it was alternate in the change to hard shelves down the hole; and the Puente field the same way; and the way we got down as deep as we did was by being very careful, first, not to pour any water in the hole to soften it, and second, by having everything ready so that there was no delay to allow the rock to rot and cave in, and chase that hole down as fast as we could and put in a string of pipe to protect it—though maybe if we were lucky we might get a hole 1500 feet in that kind of formation, but we would have to be lucky to do it, because we didn't underream and couldn't underream with anything we had had up to that time, up to the time I speak of the Sunset and Puente field. Later, about 1902, maybe, or 1901—I forget the date—I got a letter from Mr. Double regarding an underreamer, and I had heard of it before through Mr. Kellerman. I was ready to try anything that would get a hole down, and I tried it, and used the underreamer myself. In one instance we had 400 feet of very hard rock, and we were drilling an experimental well. Below that 400 feet of hard rock we struck a very bad soft, cavy formation that we could not drill any more in that hole without pipe. That was the first hole that I used the Double underreamer in, and I used it myself. I had men there sharpening the cutters and pretty near kept them busy. It was very hard and you could not get more than half a

screw at most. That would be approximately two feet and a half, without sharpening the bits. Now, we put a stem right on top of that underreamer and went through it just the same as drilling. But I kind of led up to that; I didn't do it at once. But I saw it was doing the work and I knew if I could hit it hard enough I could ream it. I never lost a cutter, I never had an accident, while reaming that 400 feet. Subsequently I got the pipe in below that 400 feet down into this soft streak successfully; got down into a bad place in the bottom, and in drawing the pipe left a joint in there. We could not get at the pipe after pulling the other pipe, because it caved on top of it. We put on a new shoe and went down to the cave of this pipe, and the bit would not hit it; it was just one side. I says to the boys, 'Put that underreamer on with three jars and crack it to it,' and damned if we didn't cut through that pipe in there and drill it up with that underreamer. I finished this particular well to 3,000 feet deep, was using eight-inch casing when I started the use of this Double underreamer, and carried the eight-inch casing 2,400 feet down.

As a matter of fact, if we didn't have an underreamer we could not have done the work. I had never seen any before. We would have had to stop the eight-inch at the depth of this hard streak and put in six-inch. Then the six-inch inside of the eight-inch would make a difference of two inches and the difference of one string of pipe. It would have been disadvantageous to have thus decreased the size of the casing because of the fact that in our past experience when we did that we were making the hole smaller and reducing the liability of getting it deep enough. Well, there

was a good deal of territory condemned here because of the fact that they had gone to the end of their string, as they called it. 1200 feet was very deep before the underreamer, and they condemned territory with millions of dollars in it because they could not go down.

The use of a successful underreamer simply made California worth millions of dollars, for the reason that all deep territory is the prolific territory. It enables you to reach the deep territory.

After my experience with this well I subsequently used other Double reamers to the entire extent of underreaming whenever necessary.

The Mr. Double that I have referred to is Edward Double, the president of the Union Tool Company of Los Angeles.

Since 1902 I have been about the fields of California all the time up to three years ago, and since three years ago have made long trips into the fields; made trips east into the fields. I have always done that. I never go east without going into the oil fields.

The first time I saw the Wilson reamer I thought it was a Double reamer. I did not take it apart or anything. I had not heard of a Wilson reamer at that time. I thought it was a Double reamer because the cutters resemble the Double, the body of the reamer and the cutters. *Prior to the Wilson reamer there was nothing really in use by practical men except the Double.* Mr. Edward North, of Los Angeles, made a kind of a reamer, a kind of a hay press, I called it. *It really could not do the work you know. I tried it; did not have any success with it at all.* And the way that happened, I bought an outfit—engine, boiler, rig, tools and all—and the North reamer was with

them. And we had a little shell under the pipe up in Ventura, and I said, 'Boys, that may scrape that off'; and we could not do it, we had to get another reamer. The thing would not latch; it came out through on top when the jaw is spread out and we could not make it work.

The North reamer I speak of is that shown in patent No. 674,793, to Edward North.

Q. 70. There is a Swan underreamer in use at the present time, is there not, and also a Leid-ecker?

A. No; I don't know that there is. *I don't know of any first-class driller or contractor that is not using the Double underreamer. I don't know of any—or the Double principle.* Now, if I saw that reamer hung on a stem swinging over the hole, I would be inclined to think they were using the Double. (The witness points to the Wilson reamer in front of him.)”

W. G. Henage, an oil well driller of long experience, details his experience with reamers prior to the Double reamer. He testifies to trying the Austrian, the Lane and the Day reamers. [Record pp. 517-525.] He says of the Austrian reamer: “It was the best we had in those days, but a mere makeshift.” Mr. Henage also says:

“The first reamer I used was an Austrian underreamer. If we would strike something hard we would either break off the dogs at the hole where the pin goes through or we would bend the pins. If the pins were bent the reamer would not be serviceable. As a practical tool to run a stem on, as we do nowadays, they wouldn't stand it at all. You couldn't ream with them because you would

break them the first time you got on anything that was hard enough to ream. It would either break or bend the cutters."

Mr. Henage also recounts his experience with another of the attempts to produce a reamer prior to the Double invention. His testimony is fully corroborative of other witnesses that the North reamer ("Defendant's Exhibit North Patent No. 647,793," Book of Exhibits p. 162) was impractical and a failure. That it was only another of the unsuccessful attempts to produce a tool to fill the crying want. He testifies:

"We tried to underream with the North reamer, *but it did not accomplish anything with it.* We worked a couple of days with it. The main trouble with it was what we called 'jack-knifing.' The cutters would work in and out of the reamer. That is, it would open and shut. The shells are very hard and we did not make a success of reaming through it." [Record p. 525.]

Asked when it was he first got a practical reamer and what it was, he says: "It was the Double reamer. The Double is the only reamer I have used since then." [Record p. 520.]

A. P. Kennedy testifies he is field manager for the Brookshire Oil Company at Coalinga. Tried a North reamer. Says: "I would not consider the North reamer strong enough to do any amount of work." [Record p. 510.] After trying the North reamer he next used a Double reamer "and have been using it ever since, except once I ran a Wilson reamer. I prefer the Double reamer." [Record p. 510.]

Henry Towsery, an oil well driller of long experience, testifies he has been drilling thirteen years (since 1900). Has used four kinds in the California fields,—the Plotts, the Austrian, the Double and the Wilson.

“The Plotts and Austrian reamers never were successful. I could never do very much with them. Of course, at that time we did manage to ream with so as to get the pipe through, that is in some places. Never saw any Plotts or Austrian underreamers used after the Double came out. The Double reamer was used universally up to the time the Wilson reamer was put on the market. The introduction of the Double reamer enabled us to drill with better success. We could get in longer strings of pipe in the hole, been able to carry longer strings of pipe through more difficult formations—harder.” [Record pp. 508-509.]

George D. Roberts, president and owner of the Stockholders Oil Co., at Coalinga, Cal., testifies he did a very little underreaming with the Austrian reamer.

“In fact, since the new underreamer came out—the Double and the Wilson—I wondered how we ever got them into the hole or what we put them in for at all. It was a kind of a *makeshift* arrangement in my opinion.” [Record pp. 506-7.]

R. E. Gray, another experienced driller, testifies he used the Austrian reamer prior to the Double. He says:

“It was never any gool, never had any success with it.” [Record p. 500.]

John E. Sanford, an oil driller from 1884 to 1913, says:

“The Austrian underreamers would ream so that you could lower the casing if you didn’t have a very hard shell. I didn’t have very good experience with them. They were too weak. They wouldn’t stand anything. They were too lightly constructed.” [Record pp. 496-497.]

He also says the Kellerman reamer was not practical or successful.

“It seems as though pretty near every time they ran it into the hole to ream they had to pull the casing to get it out.”

Charles S. Off testifies he is an oil operator and producer. Been in the oil business 30 years. That he is familiar with the Plotts, Leidecker (or Swan), Austrian, North, Double and Wilson reamers.

“After entering the Whittier field we found our formation there stands almost upright, almost perpendicular, making the shells also stand almost perpendicular. It was very difficult to make a perpendicular hole there. In fact, we were unable to do so without the use of an underreamer. The first one I attempted to use was the Austrian and even with great care it would break off the lugs about as fast as we would put it in. I next had them try the Plotts underreamer, which held its own. We had very little breakage, but the results were very unsatisfactory because it took so long to accomplish anything with it. We had one shell in No. 3, and on No. 3 we used a Plotts underreamer for five weeks in one particular place trying to get it rounded out for the purpose of put-

ting the casing through, and while using that during that time I took out a North underreamer. The drillers condemned it before trying it. They said that they wouldn't use it and went on to state what the particular weak points were that caused them to object to the use of it. *So I finally induced them to try it and they tried it for two days with great care and accomplished nothing with it. Then we tried the Plotts again and finally got the Double underreamer and did the work in about five hours with the old style Double.*" [Record pp. 533-534.]

"After first going to Santa Maria field, Tom and Sam Frampton drilled a well known as well No. 1 on Wright's Ranch Oil Company. It became necessary to use an underreamer and I understood there was a Leidecker there and, not being able to get a Double reamer handily or to get a Double reamer at that time, we used the Leidecker several times. The work was not successfully done with it, and we got a Double underreamer and continued our work with it.

Prior to getting the Double reamer there was great necessity for the use of an underreamer in California. From my experience with the Austrian reamer I would state that *it was not a success* for the reason that the formation stood almost straight, the shells being very hard and they would break off on the lugs. The face seemed to be too wide for the shank or the shanks too weak for the lug, and it broke off. I would say that I found the cutting surface was too great for the shanks, making the shanks weak and causing the cutter to break." [Record p. 535.]

Sam G. Lamb, an oil driller of 25 years' experience, *called on behalf of defendant, testified:*

"We had trouble with the Kellerman reamer in getting it out of the hole.

I have used Austrian underreamers, Swan underreamers, Double reamers and Wilson reamers. I at one time used Austrian reamers nearly constantly for over a year. Drilled possibly four or five wells, while using Austrian underreamers, reaming shales and hard shells. *Got pretty fair results, they were frail. They was not exactly right. In some cases where it was very hard we had very little difficulty, other times where it was hard we broke the lugs sometimes and had considerable trouble. But at that time we considered them about the best we could get.* We were able to lower our casing, using Austrian reamers, but sometimes it took extra time to do so. Along about this time I run the Swan, a little after I had run that Austrian underreamer. I found that pretty much the same as the Austrian.

We used the Swan underreamers on the Prosperity Oil Company's property in Kern county, on Poso Creek.

Have used the Double reamer and in most cases we have had good results with it." [Record p. 858.]

"Q. 102. There was practically no other reamer in use out there at the time the Wilson came out, except the Double, was there?

A. I don't think so.

Q. 103. Based upon your experience then up to the time the Wilson reamer could be had, the Double reamer was the only reamer used in California?

A. *Yes, it was the only practical reamer we had up to that time.*

Mr. Blakeslee: Q. 104. You have testified about using other reamers in going through shells with them prior to using the Double reamer; in view of your testimony will you please tell us what kind—when you state that the Double reamer was the only practical reamer—that you had prior to the advent of the Wilson reamer?

A. We used the Austrian, that was the best reamer. Well, we got along with it and got the wells down, *though, really, it was not right; there was not hardly a practical reamer. We got along with that because we had no better. It sometimes took two or three weeks to do what should be done in twelve hours.*" [Record pp. 859-860.]

T. M. Frampton, a driller of fifteen years' experience, details his experiences with the attempts at underreaming prior to the advent of the Double invention. He says:

"Prior to the time I got the first Double reamer there was a demand for a successful reamer." [Record p. 436.]

He says they had no success with the North reamer (i. e., "Defendant's Exhibit North Patent 674,793," Book of Exhibits p. 162).

"The North underreamer was not a practical underreamer in my estimation." [Record p. 438.]

He tried a Plotts reamer. "It wouldn't stand any grief." [Record p. 436.]

"I ran the first Plotts underreamer that was ever made. That was in 1897. *It is not a practical reamer. It is too slow. Oh, yes, it reams.*

You can get casing down if you can get time enough, but, to my knowledge, there is none of them being run at the present time. I know that the Murphy Oil Company, on the Plotts property, is running the Double reamer at the present time. All the wells I have been to lately are running the Double reamer.” [Record pp. 438-439.]

C. L. Keiser was an oil driller for the Central Oil Co. and Fidelity Oil Co. He tried the Plotts and the Swan or Leidecker. Of the Plotts he says:

“It was very poor success, that is, as far as fastness was concerned. It will ream the hole but it takes a long while to do it—that is if it is not too hard. We *never had very much success with the Plotts reamer* but where the Plotts reamer is used and the rock is not so hard they get along with it very well, but in hard rock *we never had any success with the Plotts reamer*. We used the old style Double reamers on the Fidelity and Central. We used both styles.” [Record p. 444.]

Of the Swan or Leidecker reamer (of Defendant’s Exhibit Swan Patent 683,352), Mr. Keiser says:

“I just tried to use the Swan or Leidecker. It was not a success with me. It never did any cutting to amount to anything. I attempted to use it several times. It wouldn’t work. The cutters would not work. I attempted to use it several times—I don’t know how many times.” [Record p. 443.]

John S. Culver testified he had been drilling oil wells since 1900. He testifies:

“I am familiar with underreamers and have used them. I have used the Austrian underreamer,

the Plotts underreamer, the Double underreamer and the Wilson underreamer. Also have tried to use the Swan underreamer. We had trouble to get the Swan underreamer down in the hole, and out of the hole. We did not accomplish much with it. We put in most of our time, when we were using it, getting it out and in the hole—trying to use it.

The Austrian underreamer did the work if you could give them time enough, and the same can be said of the Plotts reamer." [Record p. 449.]

"We broke a great many cutters of the Austrian reamer and had different kinds of trouble. Sometimes they would wear and not lock. They were not strong enough." [Record p. 450.]

S. S. Frampton testifies he had been drilling oil wells since 1889 or 1900. We quote from his testimony as follows:

"I am familiar with underreamers and have used the Plotts underreamer, the Double underreamer, the Wilson underreamer and I have tried to use the North reamer and also the Leidecker underreamer.

I tried to use the Leidecker underreamer in the Whittier field the first time in about 1903. We had trouble to get it down into the hole and consequently did not run it any more. It seemed as though the cutters did not move, and the reamer worked up and down on the cutters. In trying to get the reamer out of the well hole it stuck, and we had to jar it, it would stick in the casing. Have to jar it loose; jar it up; keep pulling it and jarring it, to get it out. I presume we worked at it three or four hours. After we got it out we throwed it on the ground and give it a good cuss-

ing. *It was not practical to run it.* 'Defendant's Exhibit Sample of Swan Reamer' is like the one we used.

At about the same time we tried to use the North underreamer but found it would not stand up to hard reaming. The reaming we had to do was very hard—unusually hard. We used it one or two days and practically spoiled it, the bottom of it. We horsed it out the same as we did the Leidecker. We had to jar it and jerk it to pull it out.

The next reamer we tried was the Double. We had a very hard shell, and we was using the Plotts underreamer, and had been working for a week with it up there trying to ream, and we could not seem to make much headway with the reamer. Got a Double and it done the reaming, and we kept the reamer. Have used the Double reamer more or less ever since. Have never broken off a Double reamer cutter. Have used them a great deal, more than any other, I believe." [Record pp. 428-429.]

"We didn't use the Plotts reamer any more after we got the Double.

When we first got this Double reamer we had two Plotts reamers, they were comparatively new and in good running order. We never used them after we got the Double." [Record p. 432.]

"I do not know of any company, except the company with which Mr. Plotts himself is personally connected, and one of the managing officers of that is using the Plotts reamer." [Record p. 433.]

Defendant's witness Bert Lewis Culver says he would never have used an Austrian reamer if he could have got a Double reamer. [Record p. 242.]

“The Double reamer is a better reamer, its construction is stronger, and it had more cutting surface.

Q. 144. Then, to sum up your testimony, you would not consider the Austrian underreamer either a practical or a safe tool to use on a hard job of underreaming? Is that correct?

A. No, sir; I would consider it a back number.

Q. 145. Your answer to my question, which was put to you in the negative, might infer that you disagreed with the question. You meant that you would not consider it a safe tool or a practical tool to use on hard reaming? Is that the idea?

A. That is what I mean.” [Record p. 243.]

“Q. 176. (By Mr. Blakeslee): When you referred to the Austrian underreamer as a ‘back number,’ please state what you meant by that, more fully.

A. I meant we had something so much better that it would be folly to use anything of that kind.” [Record p. 246.]

Mr. Culver testifies he had trouble in getting the Swan reamer down through the casing. [Record p. 237.] And that the original Double reamers were superior to anything he had had previously. [Record p. 237.]

Defendant’s witness John A. Bennett also refers to “a great deal of trouble in extracting it (the Swan reamer) from the hole after the underreaming had been done. [Record p. 834.]

Even defendant’s witness David Kinsey testifies he would prefer the Double reamer to the Austrian. “They do better work.” “Their cutters are placed in

better position." They do better work so that you could ream close to the bottom and closer than you could with the Austrian." [Record p. 824.] He also testifies:

"Q. 138. You say that with these Austrian reamers you had a great deal of trouble to cut through a hard formation and to get the pipe through, will you please explain to us in detail just what you mean by that answer?

A. We always attributed it to the idea of the narrowness of the dogs or cutters. It was hard to get them to cut a larger hole through a hard formation, consequently the pipe would not follow.

Q. 139. Did you have any trouble with the Austrian reamer key-seating?

A. We did. We thought we did, we thought that was where the trouble was.

Q. 140. I suppose you mean by 'key-seating' that the two dogs or cutters with the Austrian reamer cut spiral grooves into the formation instead of cutting a round hole.

A. Yes, sir." [Record pp. 824-825.]

"Q. 157. What depths of holes were those wells that you drilled prior to 1908?

A. 1200 feet, probably 1250 feet, was about the depth, from 400 feet to 1250 feet.

Q. 158. And what was the general range of depths of the wells that you drilled with the Double and Wilson reamers?

A. From the surface to 4800 feet." [Record pp. 825-826.]

Thomas J. Griffin testifies that he is a mechanical engineer.

"Has been connected with drilling oil wells, first experience in 1876. First experience in Texas.

Have drilled in Virginia, West Virginia, Texas, Old Mexico and California. Drilled in Corsicana, Texas, in 1880. Went to Ohio in 1884. Was in the mill and well machinery business in Galveston, Texas. Went to Old Mexico in 1904. Drilling for S. Piersch & Son for three years. First experience in California was with the Western Union Oil Company at Orcutt. Have used Wilson and Double underreamers. Stated that from seventy-five to eighty per cent of reamers used in California are Double reamers. Ten per cent are Wilson. Have used the Mack, the Swan and the Austrian underreamers." [Record p. 94.]

"The first underreamer I used was in 1892 in the West Virginia fields. It was the Mack reamer. The old Mack reamer had a spring-actuated rod hinged or put together with a lug coming out of the side of the mandrel and wedging down between the cutters for the purpose of expansion. I tried to use it for about three months but abandoned it as casing would not follow. The patent to Mack No. 496,317, dated April 25, 1893, shows the reamer I refer to. Then tried the Austrian reamer with no success. The well was lost because the tools got stuck in the hole with the reamer on the bottom of the tools. The rope was parted and we failed to recover the tools. Underreaming was necessary in the West Virginia field at that time. The Mack and Austrian underreamers were the only ones we had. The next underreamer I used was in Corsicana, Texas, in the year of 1895. It was a Swan reamer and I also used the Austrian reamer there. Put down one well with the Swan reamer. Well was about 1,100 feet deep. Had only two small shells to

ream which we did with the Swan. The Swan did not give satisfaction. We had a drive shoe at the bottom of the casing. We were using what was known as drive pipe and what we didn't get out with the old Swan and the Austrian we broke off and then drove the pipe through. Next use of underreamers was in Texas where I contracted to drill a 2,000 foot artesian water well. I used Mack, Swan and Austrian reamers. I was continually changing from one to the other, trying to get the best results. I had absolutely no success with either of these reamers, as I had to pull the casing and start the hole over with a larger bit to enable me to get down to the proper depth. In 1900 I tried to use a Mack underreamer at Spindletop. I failed as I could not enlarge the hole. Lost two wells on account of losing the tools in the bottom of the well. Next use of underreamers was at the Isthmus of Tehuantepec where I used the Mack, the Austrian, the Swan and the Double.

Q. 108. How did you come to use all four of such reamers in drilling such wells?

A. We had the Mack and the Austrian and the Swan on the lease, and as several had tried prior to my going down there to operate the lease and they had made a failure of it, Mr. Bodes, the general manager of Pierson & Sons of the City of Mexico, asked me did I know of another underreamer; that they were having a great deal of trouble with the underreamers that they had; that their trouble seemed to be the underreamers and he wanted to know if I knew of another underreamer. I told him that I had not used the other underreamer, but I understood that it was a very fine underreamer and I had been told by some

friends of mine from California that they had used the Double underreamer up in the Kern River field, and that they had reported to me that it was perfect. He asked me did I know whom to get the reamer from. I told him that I did not, but I presumed that the Oil Well Supply people of Beaumont, Texas, could secure them an underreamer. He said 'All right; I will wire them or our agent in New York to secure the underreamer and ship it down by fast boat to Vera Cruz and get it to you as soon as possible. You go on down and take charge of the lease and do the best you can with the old underreamers.' I did so. The first well that I went in with the old Austrian underreamer, after drilling several days I found that it was cutting what I thought to be a circular thread or key-way in the rock, and I ordered the driller to pull out the reamer. He said he had had it out about two hours before and put on new or sharp lugs, and that he didn't think it was dull. I says, 'Pull it out and let us see what we are doing.' He started out with it and his lugs were off—they were turned up, rather—and formed a wedge, and he jarred about forty-eight hours trying to loosen them up, and finally whipped off the line from the rope socket and left the tools in the hole. After fishing several days I got hold of them and tried to get the tools out and lost another string of tools in there and eventually had to cut the casing and shoot it off above the tools and sidetrack them. But I didn't do that on that well until after I got the Double reamer.

Q. 109. Explain what you mean by sidetracking in the last answer.

A. We term sidetracking in drilling where we have a crooked hole or have lost tools in the hole

and have to drill through and start above the obstruction by filling in the hole with rock or old iron or brickbats or something of the kind and either inserting a shoe or wedge and starting in to drill at the side of the casing and making a new hole from that point down.

Q. 110. Go ahead and finish your testimony in regard to your experience on the Isthmus of Tehauntepec with the underreamers referred to.

A. During my wait for the Double reamer that did come by way of New York,—as the boats were only sailing from New York to Vera Cruz,—I put in the Swan underreamer in another well and lost the lugs. I put on another set and went down and tried to drill them out of the way. The lugs turned over on me, pulling up through the shoe of No. 11 well, and I jarred for about forty-eight hours on that and finally lost that string of tools. I fished for them and got hold of them but never was able to get them out of the well. The result was that I had another sidetracking job on No. 11. After the arrival of the Double underreamer—we had practically suspended operations except on two other strings of tools that we were running where we had not got down to the shell formation—we waited for the Double reamer. I went into the original one where I had first lost the tools and drilled through and went in with another string of casing and went on down. As I drilled through the side of the casing, I had to enlarge that and I ran the Double underreamer in and drilled off the old iron and sidetracked the string of tools successfully.

Q. 111. How deep did you complete that one?

A. 2,100 feet, when we drilled into salt water and abandoned the hole.

The next underreamer used was at Torreon, Mexico. We used the Double reamer and finished the contract with it successfully. My next experience was in Los Angeles on the Niles Lease in the Salt Lake oil field. Used Double and Wilson reamers there. We borrowed a Double reamer from the Salt Lake oil people. They had been using Wilson reamers exclusively. The introduction of a successful reamer was the greatest blessing that was ever bestowed on a driller or oil company. Prior to the introduction of the successful underreamer it was a long, tedious and expensive operation to get a hole in a great many of the oil fields over 1,500 feet deep. *The Double reamer was the first successful reamer.* I do not consider the Swan, Mack or Austrian underreamers successful. I never saw one of them that I considered successful or even safe to go into a hole, and at the present time I would not attempt to put one of them in a hole." [Record pp. 100-105.]

This testimony most emphatically supports the findings of Judge Cushman as to the important addition to the art of drilling oil wells made by Edward Double by the invention of the patent in suit. Complainants submit that these proofs would have supported a finding that the Double invention produced the first really successful underreamer. It is clear that upon the merits of the Double invention such underreamer went into immediate and general use and superceded all the prior devices for the purpose. Is it not equally clear that prior to Mr. Double's invention the only things possessed for the purpose were mere makeshifts, used only by reason of a successful tool for the purpose not

existing? The proofs conclusively show that the Double invention filled a long felt want.

“The patentable novelty of the process is not only indicated by large sales but also by the unassailable evidence of that most sincere form of flattering recognition, namely, imitation and appropriation by rival manufacturers.”

American Graphophone Co. v. Universal Co.,
151 Fed. 595, C. C. A. 2nd Cir.

As said by this court, in Morton v. Llewellyn, 164 Fed. 693:

“Apart from the presumption of novelty that always attends the grant of a patent, the law is that when it is shown that a patented device has gone into general use and has superceded prior devices having the same general purpose, it is sufficient evidence of invention in a doubtful case. The Barbed Wire Patent, 143 U. S. 275; Keystone Manufacturing Company v. Adams, 151 U. S. 139; Irwin v. Hasselman, 97 Fed. 964; Wilkins Shoe Button Co. v. Webb, 89 Fed. 982; National Hollow B. B. Co. v. Interchangeable B. B. Co., 106 Fed. 693.”

“In determining the question of invention, the fact that the article produced supercedes all other appliances, or that a useful or commercial result has been attained, or that the value of the thing patented has been recognized by the public in extensive use, has a controlling if not conclusive effect; *and it should have on obvious principles of*

justice to one who sees that which he suggests constantly adopted and used by others."

Wilkins Shoe B. Co. v. Webb, 89 Fed. 982;

Krementz v. Cottle, 148 U. S. 556;

Star Brass Co. v. Gen. Elec. Co., 11 Fed. 398;

Union Biscuit Co. v. Peters, 125 Fed. 601;

St. Louis Co. v. American Co., 156 Fed. 574,
577;

Diamond Rubber Co. v. Consolidated Co., 220
U. S. 428;

Heinz v. Cohn, 207 Fed. 547 (C. C. A. 9th Cir.)

As said by Judge Cushman, in his opinion [Record p. 47]:

"It is not meant by this that patentable invention is left substantially in doubt upon an inspection of the alleged anticipating devices and the evidence concerning them, *for it is not.*"

On the contrary these proofs would indicate that Judge Cushman's finding that:

"Upon consideration of the prior art, including the alleged anticipating patents and devices, and the marked success in the trade and in operation of the Double underreamer, I find that it constituted combinations of decided merit, entitling complainants to a fair range of equivalents,"

is a very conservative estimate of the Double invention and one which is most thoroughly supported by the proofs. The trial court could readily have found support for a finding that the Double invention was a most radically new thing—striking out into constructions and interrelations of parts of extreme merit and

in fact most revolutionary in this art. An invention entitled to the most liberal treatment in order that the protection given the inventor by his patent might be commensurate with the benefits accruing to the public from his invention.

The evidence of what the Double invention accomplished and the place in the art which it immediately took most cogently and conclusively proves that it was not a mere slight improvement in details. That on the contrary it was in reality an epoch making invention, filling a much felt want.

“The object of the patent law is to secure to inventors a monopoly of what they have actually invented or discovered, and it ought not to be defeated by a too strict and technical adherence to the letter of the statute or by the application of artificial rules of interpretation.”

Topliff v. Topliff, 145 U. S.

“The unsuccessful experiments of others tend to show the exercise of inventive genius by the one who first produced a successful result.”

Ham Co. v. Deitz, 13 C. C. A. 690.

While the first Double underreamer was manufactured during the year 1901, it was not until the year 1902 that the Union Oil Tool Company really commenced actual marketing thereof. The statement [Record p. 114] shows that prior to the commencement of the year 1905 over three hundred of the Double reamers had been sold. The sales for the year 1904 amounted alone to one hundred fifteen. When it is remembered that these were not years of great ac-

tivity in the oil well drilling art in California these sales prove conclusively the demand for the Double invention. In this connection complainants wish to pause to refute a statement made in complainant's opening brief, page 3, that "the Double underreamer was a merely transitory step in the art," and that "Less than six per cent of the underreamers appellee has manufactured and sold, as shown in the accounting in this case, conform to the specifications and drawings, and limited step in the art, reflected by the specific claims of the Double patent." No excuse can be given for thus endeavoring to interject alleged statements of fact into this hearing admittedly not supported by the record herein. Complainants insist first: that the proofs on accounting do not show any such thing. Second: that this court will try and determine this appeal on the record and not on matters claimed to exist *de hors* the record. The fact that the Double invention was not merely a transitory step is proven, first by the fact that neither the Union Oil Tool Company, nor its successor, Union Tool Company (one of the complainants) has ever abandoned the use of such invention. On the contrary it has been fully embodied in every reamer manufactured by these companies. Furthermore such statement is disproven by the fact that the Double invention is the very basis and foundation of the reamers manufactured by defendant herein. The Wilson reamer cannot and does not exist except upon the Double invention. The defendant's statement that the Double invention was abandoned by the Union Oil Tool Company before the Union Tool Company came into existence is an absolute misrepres-

sentation. This is recognized by the testimony of both Elihu C. Wilson and William W. Wilson, officers in the defendant company. Like Bell's telephone, Morse's telegraph, Edison's phonograph, Wright's aeroplane, and every other basic invention, improvements have been made, but the underlying original Double invention is found in every one of the Union Oil Tool Company's and of the Union Tool Company's reamers, and in every one of the defendant's reamers.

As has been pointed out by the testimony heretofore quoted and referred to, prior to Mr. Double's invention, many attempts had been made to produce a successful or satisfactory underreamer. That none had succeeded is also clearly proven.

Defendant's amended answer [Record, p. 29] points out sixteen patents which had been taken out for abortive attempts to fill the demand for such a device. These attempts extend over the period from 1868 to 1901. The last amendment to the answer points out another unsuccessful attempt to solve the problem,—the Jacob S. Brown patent. On pages 30 and 31 of the record, the answer refers to other attempts to fill the want of such a tool. One of these attempts was the so-called "Austrian" reamer,—another the so-called "Canadian Pole Tool System" reamer,—another the O'Donnell & Willard failure,—abandoned by one of the richest oil operators in California, Thomas A. O'Donnell and his co-striver Arthur G. Willard, half owner of the defendant corporation, as unsuccessful and inoperative.

The defense in this case, instead of showing that there was no invention in the subject of the Double

patent in suit, clearly proves that invention of high merit was produced. For a general observation as to these is that the citation of so many patents by a respondent in an infringement suit sometimes tends, as we have several times said, not so much to weaken the complainant's position as to strengthen it, by showing that the trade had long and persistently been seeking in vain for what the complainant finally accomplished.

1ST CH.

As said by the Supreme Court in *Keystone Mfg. Co. v. Adams*, 151 U. S. 139:

"Where the patented invention consists of an improvement of machines previously existing, it is not always easy to point out what it is that distinguishes a new and successful machine from an old and in effectual one. But when, in a class of machines so widely used as those in question, it is made to appear at last, after repeated and futile attempts, a machine has been contrived which accomplishes the result desired, and when the patent office has granted a patent to the successful inventor, the court should not be ready to adopt a narrow or astute construction, fatal to the grant."

Therefore, before taking up a consideration of the Double invention and a comparison thereof and of the claims of the patent in suit with the infringing Wilson and Wilson improved reamers, it is fitting that two of the unsuccessful and abandoned attempts to produce successful reamers be considered as these two are evidently greatly relied upon by defendant. The first of these is the

sentation. This is recognized by the testimony of both

in every one of the defendant's reamers.

As has been pointed out by the testimony heretofore quoted and referred to, prior to Mr. Double's invention, many attempts had been made to produce a successful or satisfactory underreamer. That none had succeeded is also clearly proven.

Defendant's amended answer [Record, p. 29] points out sixteen patents which had been taken out for abortive attempts to fill the demand for such a device. These attempts extend over the period from 1868 to 1901. The last amendment to the answer points out another unsuccessful attempt to solve the problem,—the Jacob S. Brown patent. On pages 30 and 31 of the record, the answer refers to other attempts to fill the want of such a tool. One of these attempts was the so-called "Austrian" reamer,—another the so-called "Canadian Pole Tool System" reamer,—another the O'Donnell & Willard failure,—abandoned by one of the richest oil operators in California, Thomas A. O'Donnell and his co-striver Arthur G. Willard, half owner of the defendant corporation, as unsuccessful and inoperative.

The defense in this case, instead of showing that there was no invention in the subject of the Double

patent in suit, clearly proves that invention of high merit was produced by Mr. Double.

The citation of a large number of patents as anticipations tends to strengthen rather than to weaken the patent sued upon, by showing that the trade has long and persistently been seeking in vain for what the complainants finally accomplished."

Forsyth v. Garlock, 142 Fed. 461, 463, C. C. A. 1st Cir.

As said by the Supreme Court in *Keystone Mfg. Co. v. Adams*, 151 U. S. 139:

"Where the patented invention consists of an improvement of machines previously existing, it is not always easy to point out what it is that distinguishes a new and successful machine from an old and in effectual one. But when, in a class of machines so widely used as those in question, it is made to appear at last, after repeated and futile attempts, a machine has been contrived which accomplishes the result desired, and when the patent office has granted a patent to the successful inventor, the court should not be ready to adopt a narrow or astute construction, fatal to the grant."

Therefore, before taking up a consideration of the Double invention and a comparison thereof and of the claims of the patent in suit with the infringing Wilson and Wilson improved reamers, it is fitting that two of the unsuccessful and abandoned attempts to produce successful reamers be considered as these two are evidently greatly relied upon by defendant. The first of these is the

Day Underreamer.

We are not dependent upon inference as to the total lack of success of this experiment. There was a great demand for an underreamer in Ventura county, California, in 1890 and the years thereafter. These were the days before the formation of the Union Oil Company of California. Mr. Chester W. Brown, the present manager of the field department of the Union Oil Company gives us the history of the Day reamer. He testifies that he has been in the oil business since 1887. That he worked in connection with drilling oil wells in Ventura county, California, until 1894, then went to Los Angeles and operated in the Los Angeles fields, and then went to Peru, South America. That he is familiar with underreamers and their use. He testifies:

“Am familiar with underreamers and their use. The first underreamer we attempted to use was the Day underreamer. We used or attempted to use that reamer on well #3 on the Astarta Oil Company in the Ojai District, in Ventura county, in 1890. Beside myself working on that well was Homer Hennage, E. G. Chamberlain, John McGee, I was tool dresser at that time.

We endeavored to use this reamer to carry our string of $5\frac{5}{8}$ casing, as I remember the size; but we were continually breaking it, losing parts of it in the hole, and finally—I am just trying to remember whether we used that to a finish on the well or whether we drove that the latter part. I think we did. Finally resorted to driving our pipe instead of trying to underreamer.

I produce the original book of logs of the wells drilled at that time; these wells now being the property of the Union Oil Company, and the book being a part of its records. Subsequently to drilling this Astarta well I drilled other wells in Ventura county, but did not use this Day reamer. We drove our pipe. In 1891 we used the same reamer in the Bardsdale field, in Ventura county on well #1. It was a failure. The rock being harder, we broke the mandrel and lost the stem in the well expanded. On the log of that well I notice the following: 'At 1060 feet an attempt was made to run an underreamer, but the keys broke and left half of it in the well expanded.' That refers to the Day reamer. We drove our pipe after that. *I consider the Day reamer too frail to be of any consequence.*

I was present at the time the Day reamer was lowered into the 1891 hole when it was broken. Just the upper part of the mandrel comes out. That is the part which I think may have been referred to as the key. Right here I would say I am not sure as to the construction of the square part and the round, whether that was a solid body or whether it was, perhaps, fastened with keys at that point. The round part which is covered by the spring may have been connected by keys to the square-mandrel which worked through the head. Our record shows that we were in red sandstone. That is a formation which I do not think is encountered outside of Ventura county. It is softer than the usual formation. We broke the Day reamer the first time that we used it. We never accomplished anything, we never lowered any casing through any hole that we reamed with it. The Union Oil Company, the company I

am associated with, is affiliated with the Union Tool Company. In using the Day reamer in 1890 we used that reamer I would say for several weeks, during which time springs were lost and drilled up, reins were broken; the reamer was sent to the shop to be repaired, and we always drove the pipe that followed our operation of underreaming. With the weight of stems and tools we use now-a-days, I don't think the Day reamer would stand half a dozen blows. We thought it reamed in places and then in other places where the rock was harder we thought it did not. As we drilled, however, the reamer advanced downwardly below the depth where we commenced reaming. At the time of running the Day reamer if there was anyone that had had any experience running underreamers at that time it was Henage. We did not buy any more Day reamers and I never saw one after that. After losing this Day reamer in the Bardsdale well I think we drilled about ten other wells in that locality." [Record, pp. 538-542.]

The testimony of W. G. Henage corroborates Mr. Brown that this Day makeshift was discarded because it was unsuccessful and did not operate successfully. That it was too frail to stand up and do the work. Mr. Henage gave his testimony in 1913. He was then drilling in the Maricopa or West Side field, Kern county, California. He testifies that he had been in the oil drilling business since the eighties. He says:

"While in Ventura we used an underreamer known as the Day underreamer. I think we secured it from Joe Austin. It was called the Day & Austin or Eastwood reamer. He was the

manufacturer of drilling tools at that time, in San Francisco. The lugs or cutters were about three feet long and there was a mandrel inside of it and passed through it which had a spring on and a block at the end of the mandrel. The spring was opened and exposed. We used it on a well about 400 feet. That was the amount of work it done. It was not satisfactory to us nor to any of the companies. *We could not ream.* It took us so long to ream that we naturally wore it out. It would drive and stick when you put any weight on it, and the stems used in those days were about $3\frac{1}{2}$ inches in diameter and 18 and 20 feet long. That would be a very light stem. We succeeded in finishing the well in which we used this Day reamer. Well, we wore it down and reamed it with this reamer, what we could. We had several breaks on it. One thing that would break frequently was the spring. This was due to the reamer sticking and the tools working would strike the block up against the spring and get the cutters sticking in the hole. Naturally, when you would ream the hole, and it was sand rock there mostly, the cutters would dive down in it. They were narrow and the cutting surface was small on them and they would dive ahead, and as the tools came up, it would contract the spring and the spring would become crystallized and all broke to pieces. We finished that well with it and then it was thrown out and then we drilled three more wells in that vicinity, but we never used it afterwards *because we considered it a failure as far as a tool was concerned. We drove the pipe afterwards on those other wells.* Those lugs would bend sometimes. They would come out twisted around * * * bent, * * *

and there was danger of leaving it in the hole, and it took so long to underream with it that the company concluded they would not use it any more and threw it out. Defendant's exhibit small working model of Day device looks something as I remember the Day underreamer looked.

Sometimes in taking it out of the well these lugs were twisted around and in diving you see it would come together there and spring out here. That is the weak end of it, and you can't make it strong, because if you would make it strong it would be so stiff that it would not ride down in the casing. The spring would break frequently. *Based on our experience with this Day underreamer, I would call it impractical as an underreamer.*" [Record pp. 517-519.]

This is the testimony of the disinterested witnesses as to the practical attempts to use the Day reamer. That it was tried and found wanting is clear. These facts are clear from the testimony of the owner of the Day patent and the man who attempted to make and sell the Day reamer,—Mr. Joseph Eastwood, who was called on behalf of the defendant. Mr. Eastwood bought the Day shop and patent. He made one Day underreamer. He says: "I tried to sell the underreamer but there was not much demand for them." [Record p. 870.] "If I could get orders I would have kept on making them."

It is clear, therefore, that this Day attempt was unsuccessful and commercially a failure. In this case it serves only one purpose: to emphasize the importance in the well drilling art of the Double invention;

to show and to demonstrate the magnitude of the success and importance of Mr. Double's invention.

A comparison of this Day failure with the so-called "Canadian Pole System" reamer shows conclusively that the latter would also be an utter failure as a practical tool. The constructions of the two are substantially the same. The faults are the same. The Canadian or Petrolia reamer serves no other purpose in the case than to point out the substantial novelty and the great step taken by Mr. Double. Neither of these show a construction or interrelation of parts which is an anticipation of the Double invention. Neither of them possess the features or combination which make the Double invention practical, nor the features and combinations which have been appropriated from the Double invention by defendant in its Wilson and Wilson Improved reamers.

Prior to Mr. Double's invention an oil operator and driller by the name of Thomas A. O'Donnell, with the assistance and co-operation of Arthur G. Willard (the vice-president, manager and stockholder in the defendant) attempted to produce an underreamer. It failed. This attempt also serves but to magnify the inventive genius of the man who produced a successful and operative underreamer. While the mode of operation of the O'Donnell and Willard reamer is very distinct from a reamer embodying the Double invention, such, for instance, as the reamers manufactured by complainants and defendant, and even if it could be held that such O'Donnell and Willard's unsuccessful abandoned attempt to produce a reamer

did in fact have a place in the art prior to Mr. Double's invention, the same would not in any substantial degree anticipate or limit the scope of the Double invention or patent. This O'Donnell and Willard experiment simply serves also to illustrate the many attempts made prior to Mr. Double's invention to produce a practical and successful reamer.

The record shows that in 1899 O'Donnell and Willard had one of these reamers built for them. They first took it out to a place near Whittier, Los Angeles county, California, on the El Moro lease, and tried for a day to get the device to work. They never succeeded in underreaming a foot. It was rolled down the hill and discarded as no good, and that was the end of that attempt to use this experiment. It was built in substantial accordance with the drawings of the O'Donnell and Willard patent, although certain features of the patent were not in this first experiment. Nor were such locking and tripping features and mechanisms of the patent ever embodied in any reamer.

Mr. O'Donnell's testimony will be found commencing at page 363 of the transcript of record. He testifies that the first O'Donnell and Willard reamer was taken out to Whittier to the El Moro Oil Co. property. That after its trial on this El Moro lease it was taken out to a property known as the Alliance Oil Company near the San Fernando tunnel in Los Angeles county. He says:

“and in view of the difficulties that I had in getting this reamer in and out of the hole out at

Whittier—well, into the hole; no difficulty in getting it out—I advised Arthur that it seemed to me *to be necessary* for us to devise some scheme to hold those knives down without the necessity of tying them and wedging them with sticks.” [Record p. 368.]

Mr. O'Donnell thus admits that the attempt to use this reamer on the El Moro lease at Whittier was unsatisfactory and unsuccessful. This is also corroborated by the testimony of H. G. Bailey, whose testimony commences at page 424 of the transcript.

Mr. Bailey testifies that he worked on the El Moro Oil Company lease; that the property was his grandfather's property. He testifies:

“I was employed on the El Moro lease as a tool dresser in about 1901. I met Tom O'Donnell at the El Moro well. They brought an underreamer out there to try, Mr. O'Donnell, I don't know who was with him; I think it was Dick Harris, though, manager of the oil company. *They tried to run that reamer. We got the reamer down to the bottom of the hole and throwed a rope and tried to find the bottom of the casing, and the reamer stuck in the bottom of the casing; tried that several times and knocked it loose, and it would stick in the shoe every time you pull up against it. Mr. O'Donnell said, 'Pull it out; won't run it; it will have to be fixed.'* We got it out of the hole. About a day getting it out of the hole. We loaded it on to a cart and brought it down to the Whittier Crude lease and left it there. I don't know what became of it. It took about a day to get it out of the El Moro well hole.

It would stick at every joint of the casing, almost every joint; especially those joints that was not screwed together tight, the cutters would stick; have to hitch on and jar it up through there. This reamer was not actually used to underream at the El Moro well. It was never returned to the El Moro property after it was carted down to the Whittier Crude lease. I know it was carted down to the Whittier Crude lease. There was a heavy rain come up the day we was running the reamer, and washed out the road. The other tool dresser and myself put the reamer on a cart and pulled it down by hand, down to the Whittier Crude lease; it would be about a mile. They wanted it pulled down there so they could load it into a wagon. Have never seen that reamer since until today. No one pointed it out to me. I knew it. (Witness identifies Defendant's Exhibit O'Donnell & Willard Underreamer.) The reason I have such a clear recollection of this happening is that the land belonged to my grandfather, and he wanted me to go up there and kind of look after the well, and see that everything was all right; that was one reason I was up there as tool dresser on that well." [Record, pp. 424-426.]

Mr. Bailey's testimony is corroborated by the testimony of S. S. Frampton:

"I was on the El Moro property when O'Donnell brought that reamer out to be tried. He came to our well at one time and asked if we wanted to try it. We did not care about trying an underreamer which other people had had trouble with as they had on the El Moro. We would not try it. At that time we were contract-

ing for the Whittier Crude Oil Company. The O'Donnell reamer was brought down from the El Moro and throwed off on our lease. It was not brought to us. Defendant's Exhibit O'Donnell & Willard reamer looks like it. I refused to attempt to use it, because of what I had heard in regard to its use at El Moro." [Record p. 430.]

This is also corroborated by the testimony of Mr. Charles S. Off [Record p. 534], as follows:

"I am familiar with the O'Donnell and Willard underreamer. The El Moro Oil Company well was drilled by my brother-in-law, R. A. Moranville. The El Moro well was about three-quarters of a mile from my property. I met Tom O'Donnell of Los Angeles, California, in the Whittier field. I know of the attempted use of the O'Donnell & Willard reamer at the El Moro well. At that time my brother-in-law told me he had tried the O'Donnell & Willard reamer and that it did unsatisfactory work, or, in fact, did not do any work; that you couldn't make it do satisfactory work. I saw that underreamer. It was hauled or rolled down on to our property and we had a team take it from that point—had it taken away. *We had use for an underreamer at that time.* We talked with Sam Frampton and Tom Frampton, my drillers, in regard to it at that time. Mr. Frampton refused to use it. My brother-in-law, Mr. Moranville, died about four years ago."

Actions speak louder than words. Is it not a safe judgment to determine that this O'Donnell & Willard device was unsatisfactory and unsuccessful when it is

shown that Mr. Off had need of underreamer at this very time? When it is shown that this very tool was tried within three-quarters or half a mile of where he was drilling and was brought down by his well and was offered to him for use, that he did not use it. That his drillers refused to run it into the hole? It is in accord with ordinary human experience that they were then given the actual truth respecting the results of the attempt to use it at the El Moro well and upon the basis of such reports made at the very time, condemned it. These acts of the parties are not their mere idle words given years after the occurrence and dimmed by fading recollection of what was said or done. On the contrary the testimony is a statement of the acts of the parties at the time. These acts of Mr. O'Donnell, the Frampton's and Mr. Off clearly show that no one at that time considered the O'Donnell & Willard reamer a safe or successful device. That on the contrary the attempted use at the El Moro well condemned it as a failure. Undoubtedly it was a disappointment to both Mr. O'Donnell and Mr. Willard. Had its history stopped there it would have clearly been an abandoned experiment having no place in the art. Its subsequent history shows that it never performed better. In the language of this court in *Parker v. Stebler*, 177 Fed. 210, 212: "It was a disappointment * * * and was a failure and was discarded by him." The fact that Mr. O'Donnell adopted the Double reamers also brings this abandoned experiment within the rule and decision of *Parker v. Stebler*, for O'Donnell "discarded his own invention and used the appellees'."

T. M. Frampton also testifies in regard to this O'Donnell & Willard reamer at El Moro as follows:

"I am acquainted with Tom O'Donnell, of Los Angeles. He had an underreamer that he tried on a well that was drilled for—I guess he was perhaps interested in the company—on the El Moro. I was not there and seen the reamer used but only know what I was told. It was just prior to the time that I had the experience with the North reamer. The circumstances were these: I saw them bringing the O'Donnell reamer away from there, and they had had a lot of trouble with it, getting it out of the hole, I guess. At least that is what they told me. They went up there and brought it down past my well where I was working; and I went out and looked at the reamer, and I was very anxious to see a reamer with the cutters in the bottom. That was the first reamer I ever saw that the cutters worked in the bottom. And from what I knew and what I talked with the boys, I was acquainted with them all, they said they had had a great deal of trouble with it up there. It was Moranville and Bailey had it on a buggy. Moranville is dead. Bailey's full name is Hibben Bailey. I know it was at the time I was working on the first well for Mr. Off, 1900, 1901." [Record pp. 442-443.]

It is clear, therefore, from this testimony that after this unsuccessful trial at the El Moro property at Whittier changes were made in the O'Donnell and Williard reamer in an attempt to make it successful. Mr. O'Donnell says that Mr. Williard

"devised a plan that consisted of a collar acting as a sleeve on top of the reamer, with projections

of some kind that I am not now familiar with running down to these knives to hold them down while it was passing through the casing." [Record p. 368.]

Mr. O'Donnell says that they sent the O'Donnell and Willard reamer out to the Alliance well with this new experiment on it, and that when we went out to the Alliance well he found that they were

"experiencing a great deal of difficulty, principally with the sleeve on top of it, with the sand getting back of the sleeve and preventing its free working and it was necessary to be very careful and have that washed out very carefully, and I stayed up there a couple of days myself to assist him in overcoming that difficulty. My judgment was then, and is yet, that the sleeve was no improvement at all and was a detriment." [Record p. 369.]

So we see that Mr. O'Donnell's own judgment of the second attempt to use this O'Donnell and Willard experiment, even with the supposed improvement of the sleeve, was, in the opinion of Mr. O'Donnell, unsuccessful and no improvement whatever, but a detriment. If this is true then the reamer which was absolutely unsuccessful on the El Moro must have been unsuccessful and unsatisfactory on the Alliance well. The subsequent history of the O'Donnell and Willard reamer coincides with this inference for the reason that after its attempted use at the Alliance well near Newhall nothing further is heard of it,—no further attempt is made to use it.

This sleeve is shown upon the reamer in evidence as "Defendant's Exhibit O'Donnell and Willard Reamer." However, we find that in 1910 Arthur Willard and Thomas A. O'Donnell attempted to build another O'Donnell and Willard reamer making certain changes and omitting this sleeve, and that this 1910 O'Donnell & Willard reamer was not a success and was abandoned. And this although Mr. Willard when building this 1910 reamer had the advantage of many years additional experience in the manufacture of underreamers. Not even the added experience of years could enable Arthur G. Willard or Thomas A. O'Donnell to make a success of this failure.

In this connection it is to be borne in mind that Mr. O'Donnell during all these years remained in the well drilling business and had practical experience with the successful Double reamers. He adopted and used these Double reamers as soon as they came on the market.

Mr. Willard made other attempts to invent or produce a successful reamer. One of these attempts is shown by "Complainant's Exhibit A, Willard U. S. Patent 762,458" (Book of Exhibits, page 20). The application for this patent was filed on May 5, 1903. It is for an entire departure from even the mode of operation or principle of the O'Donnell and Willard experiment. Yet the evidence conclusively shows that the device of this patent was also unsuccessful and that Mr. Willard abandoned it as a failure.

The record conclusively shows that no successful device was ever constructed on the O'Donnell and

Willard principle by either Thomas A. O'Donnell or Arthur G. Willard, and that so far as the art of drilling oil wells or the art of underreaming is concerned, such art was not advanced or added to by anything done by either of these two gentlemen and remained in the same condition as though this O'Donnell and Willard experiment had never been produced or had never been tried. The O'Donnell and Willard reamer never had any place in this art. It belongs to the discarded and unsuccessful abandoned experiments illustrating the problem which was before Mr. Double and emphasizing the extreme merit of his production. It can have no other effect in this case.

Mr. O'Donnell says that this second O'Donnell and Willard reamer was moved from the mouth of the Newhall tunnel where it was tried and "It was put into a storehouse that I had out here for accumulated junk." [Record p. 370.] It remained there until it was dug up to be used as evidence in this case.

Mr. O'Donnell says further that this difficulty with the sleeve (which was placed upon the O'Donnell and Willard reamer by Mr. Willard after Mr. O'Donnell's talk with him after the attempted use at the El Moro) was sand getting in this collar and holding the knives down, that is, holding the knives or cutters or bits in collapsed position so that they would not underream. Mr. O'Donnell says that this resulted in making the tool ineffective in expanding the jaws when it got down below the casing. In other words, the jaws did not expand and Mr. O'Donnell admits that *in two days* they only got in one length or joint of pipe and that he left them, and that that is all the use that he knew of.

The testimony of William G. Lehman in regard to this reamer may be summed up as follows in the words of his answer to Q. 62:

“Well, I can’t remember but very little, only I know we used it with some success; also we had a great deal of trouble, too.

On account of sand getting in behind that sleeve.” [Record p. 395.]

Fred L. Fish was one of the men on this work at the Alliance oil well. His testimony is found commencing page 497 of the record. He says that he was about four hours getting this O’Donnell and Willard reamer out of the hole:

“It stuck all the way down the casing. To tell the truth about it, it wasn’t any good on earth for underreaming a well.”

He says he told Thomas A. O’Donnell this experiment “was no earthly good.” [Record p. 499.]

Complainants submit that the testimony of these witnesses and the actions of Messrs. O’Donnell and Willard conclusively prove that the O’Donnell & Willard device was an utterly unsuccessful tool; that it was abandoned by them as unsuccessful; and that it has no place in the art and has no effect either as a partial or total anticipation of the Double invention nor should it be given any effect whatever as limiting the scope of the Double invention or claims.

The Patent Law was enacted to encourage invention and to reward those who benefitted the public. The art of well drilling was not advanced in the slightest degree by this unsuccessful and abandoned O’Donnell

and Willard device. In fact the O'Donnell and Willard patent and device should have no more effect in this case than had the Crosby machine in the decision of this court by his Honor Judge Gilbert in *Kings County Raisin & Fruit Co. v. United States Consolidated Seeded Raisin Co.*, 182 Fed. 59. There the court said:

"The Crosby invention undoubtedly anticipates and describes the whole theory of the Pettit patent; but it does not appear ever to have been put to use, and there is no evidence that any machine was ever constructed under it. It is one thing to invent the theory of a machine. It is quite another thing to invent a successfully operating machine."

These unsuccessful and abandoned attempts to produce an underreamer clearly should have no effect either as anticipations or as limitations. This is clear under the decision of the Supreme Court in *Deering v. Winona Harvester Works*, 155 U. S. 286, where it is said:

"His efforts in that direction must be relegated to the class of unsuccessful and abandoned experiments, which, as we have repeatedly held, do not affect the validity of a subsequent patent."

As said by the Supreme Court, in *Coffin v. Ogden*, 18 Wall. 120:

"The invention or discovery relied upon as a defense, must have been complete and capable of producing the result sought to be accomplished. If the thing were embryotic or inchoate; if it rested in speculation or experiment; if the process

pursued for its development had failed to reach the point of consummation, it cannot avail to defeat a patent founded upon a discovery or invention which was completed. While in the other case there was only progress, however near that progress may have approximated to the end in view. The law requires not conjecture but certainty."

As said by the Circuit Court of Appeals for the Fourth Circuit, in *Farmers Co. v. Spruks*, 127 Fed. 691:

"It cannot be said that a patent for a device which fails to accomplish the desired end is an anticipation of one that successfully accomplishes it."

"Novelty is not negated by anything beneficially incapable of the function of the subject of the patent."

764;

Dececo Co. v. Gilchrist Co., 125 Fed. 293.

It is submitted therefore that the O'Donnell & Willard reamer and the O'Donnell & Willard patent are neither total or partial anticipations of the Double invention. That under the foregoing authorities they have no place in the prior art. Complainants are

and Willard device. In fact the O'Donnell and Willard patent and device should have no more effect in this case than had the Crosby machine in the decision of this court by his Honor Judge Gilbert in Kings County Raisin & Fruit Co. v. United States Consolidated Seeded Raisin Co., 182 Fed. 59. There the court said:

"The Crosby invention undoubtedly anticipates and describes the whole theory of the Pettit patent; but it does not appear ever to have been put to use, and there is no evidence that any machine was ever constructed under it. It is one thing to invent the theory of a machine. It is quite another thing to invent a successfully operating machine."

These unsuccessful and abandoned attempts to pro-

duce an underreamer clearly should have no effect. "The invention or discovery relied upon as a defense, must have been complete, and capable of producing the result sought to be accomplished; and this must be shown by the defendant. The burden of proof rests upon him, and every reasonable doubt shall be resolved against him. If the thing were embryotic or inchoate; if it rested in speculation or experiment; if the process pursued for its development had failed to reach the point of consummation, it cannot avail to defeat a patent founded upon a discovery or invention which was completed; while in the other case there was only progress, however near that progress may have approximated to the end in view. The law requires, not conjecture but certainty."

producing the result sought to be accomplished. If the thing were embryotic or inchoate; if it rested in speculation or experiment; if the process

pursued for its development had failed to reach the point of consummation, it cannot avail to defeat a patent founded upon a discovery or invention which was completed. While in the other case there was only progress, however near that progress may have approximated to the end in view. The law requires not conjecture but certainty."

As said by the Circuit Court of Appeals for the Fourth Circuit, in *Farmers Co. v. Spruks*, 127 Fed. 691:

"It cannot be said that a patent for a device which fails to accomplish the desired end is an anticipation of one that successfully accomplishes it."

"Novelty is not negatived by anything beneficially incapable of the function of the subject of the patent, even though apparently similar thereto."

Walker on Patents (5th Ed.), sec. 65.

See also:

Morey v. Lockwood, 8 Wallace 230;

Crown Cork & Seal Co. v. Ideal Co., 123 Fed. 666;

Kirchberger v. Am. Acetylene Co., 124 Fed. 764;

Dececo Co. v. Gilchrist Co., 125 Fed. 293.

It is submitted therefore that the O'Donnell & Willard reamer and the O'Donnell & Willard patent are neither total or partial anticipations of the Double invention. That under the foregoing authorities they have no place in the prior art. Complainants are

therefore entitled to have both the O'Donnell & Willard reamer and patent wholly disregarded. To do so is to give to them exactly the effect they have in fact had in the well drilling and underreaming art.

There remains another unsuccessful attempt to produce an underreamer. It is the Jacob S. Brown attempt. It is true that this is shown by a patent. But so was the Crosby raisin seeder in *Kings Co. v. U. S. Con. S. R. Co.*, 182 Fed. 59. The issuance of a patent simply shows that the examiners of the United States Patent Office are paper experts, if experts at all. They cannot be presumed to be able to infallibly determine from mere drawings and verbal descriptions whether a device constructed in accord with such drawing or description would in fact be practical or useful. In connection with the Brown patent and proposed underreamer we have the testimony of the persons who considered it at the time of its production.

Defendant's witness Fred W. Jones testifies to discussing this proposed Brown reamer with Mr. Edward Double. He testifies:

"Well, it is pretty hard for me to remember all the details of the conversation, but the principal feature of it was whether we could manufacture that reamer the way it was or whether we could not, and I tried to explain to Mr. Double that it couldn't be made that way, and if it was made it would not be a success when in the well. That was the first thing we had to decide. We didn't want to make anything and send it out as a failure if we could help it. Mr. Double asked me the question whether it would work or not

and that is what I told him.” [Record p. 884, Q. 66.]

We call the court’s attention to Mr. Jones’ testimony in respect to the impossibility of manufacturing this proposal of Mr. Brown’s. It is to be noted in this connection that Judge Cushman heard the testimony of this witness and others in respect to this Brown patent and proposed Brown reamer and we call particular attention to page 886 of the record which contains the remarks of his Honor Judge Cushman during the trial:

“The Court: This witness has established that this Brown device was a failure.”

The court had the witness before him. Heard his full testimony. Had the model exhibits explained to him. Under these circumstances this finding of fact is entitled to great weight.

Adamson v. Gilliland, 37 Sup. Ct. Rep. 169.

Mr. Edward Double, cross-examined by counsel for defendant regarding this Brown proposal for an underreamer says:

“I consider it an impractical tool.” [Record p. 973.]

Under the rules of law heretofore referred to complainants submit that they are entitled to have this Brown proposed reamer discarded from consideration. The trial court closed its consideration during the taking of proofs in open court with the ruling that it had been established that it was a failure. Defendant did not except to this ruling, nor has de-

fendant produced a single witness who has attempted to show that a Brown reamer could be manufactured or practically used.

As said by the Supreme Court in *Carnegie Steel Co. v. Cambria Iron Works*, 185 U. S. 425:

“This defense presents the common instance of a patent which attracted no attention and was commercially a failure, being set up as an anticipation of a subsequent patent which has proved a success, because there appears to be in the mechanism described a possibility of its having been, with some alterations, adaptable to the process thereafter discovered.”

That the commissioner of patents did not consider this Brown patent an anticipation of the Double invention is clear from the record. It was before the examiner during the prosecution of Mr. Double's application. The Double patent was allowed after full consideration of the Brown patent.

Certainly Judge Cushman has given this Brown proposal for an underreamer at least the full weight to which it is entitled. Complainants believe he has given it even greater weight than should be given to it. It certainly cannot be held to be a publication of a successful or practical reamer. The Patent Law was enacted to reward those who added to the useful knowledge and the courts should not be astute to defeat the claims of the inventor who has produced the practical and successful device.

As said by the Supreme Court in *Keystone Mfg. Co. v. Adams* (151 U. S. 139):

“But when in a class of machines so widely used as those in question, it is made to appear that at last, after repeated and futile attempts, a machine has been contrived which accomplishes the result desired, and when the patent office has granted a patent to the successful inventor, the court should not be ready to adopt a narrow or astute construction, fatal to the grant.”

Certainly if experienced and expert mechanics could not study out a way to build or make a reamer in accordance with Mr. Brown's proposal, it cannot be held that the Brown model or the Brown patent was sufficient in law to have enabled the ordinary mechanic using the ordinary skill of his craft to have built and used a Brown reamer. If this be true then the whole Brown defense falls utterly and is entitled to no consideration whatever.

Circuit Judge Putnam, in *Consolidated Company v. American Corporation*, 82 Fed. 993, at page 996, says:

“There have been introduced in the records 29 patents, beginning as early as 1859, for improved electric heating apparatus, of which 24 were introduced by the respondents. The respondents maintain that the field of experiment with reference to electric heating for surface cars is very modern, and, by cross-examination of the patentee, they succeed in putting it back not earlier than 1889; but the record contains, within the period commencing in 1889, and ending with the date of the application for the patent in issue, 13

patents relating to this particular subject-matter, all of which seem to have proved failures in practice. All these, with one exception, issued from the patent office of the United States. How many other like patents, with like unsuccessful results, were taken out in foreign countries, the record does not show; but, in view of the activity of the electrical art during that period, the court cannot hesitate to assume, as a matter of common presumption, that the number not proven is much larger than the ^{at} proven * * *. When, under the circumstances proven, a result has been obtained so successful and important as that of the device covered by the patent in suit, after so many efforts attempted by a class so skillful and vigilant as the electrical engineers of modern times, it would be folly for the court to deny that the result involved something more than ordinary mechanical work, or to deny the reward which would be commonly given by disinterested intelligent minds."

The Defense that Fred W. Jones and Not Edward Double Invented the Subject-Matter of the Patent in Suit.

The application for the Double Patent was made on October 26, 1901, and the patent was issued July 28, 1903. While this application for patent was pending in the United States patent office Mr. Double made application for patent upon another form and embodiment of the invention. This application eventuated in the grant of "Complainant's Exhibit Double Patent 766,197" (Book of Exhibits, pp. 8 to 13) on August 1, 1905. While this application was pending in the

U. S. patent office an interference suit or contest was instituted in the U. S. patent office to determine whether Edward Double or one Edward L. Mills, of Los Angeles, California, was the original and first inventor and entitled to the patent upon this invention. This interference was determined in favor of Edward Double.

During the taking of testimony in such interference Fred W. Jones was produced as a witness on behalf of Edward L. Mills and had full knowledge at that time not only of the pendency of this application by Edward Double thus involved in this interference, but of Mr. Double's application for the patent in suit. Mr. Jones does not claim that at that time he made any assertion whatever that he was the inventor of the invention in controversy in said interference or of the invention of the patent in suit.

The record in this case shows that the first reamer built by Mr. Double at Santa Paula, California, was completed during the month of July, 1901, and was put into practical operation on July 26, 1901. This is the reamer which is in evidence as "Complainant's Exhibit Double's First Reamer." This particular exhibit was in evidence in said interference and before Mr. Jones when he testified therein. It is the very reamer he now claims to have invented.

Mr. Jones gave his testimony in the interference on August 10, 1903, when these matters must have been fresh in his memory, and it was during the giving of this testimony that Mr. Jones gave the answer quoted in Judge Cushman's opinion. [Record pp. 47-48.]

In this connection it must be remembered that Mr. Jones had all the provocation possible to have evoked from him *in 1902* a claim that he was the inventor, if such had been the case.

The record shows that in 1902 Mr. Jones was engaged in business with Mr. George L. Skinner at Santa Paula, California, doing business as the Santa Paula Oil Tool Works. They were manufacturing a reamer *which had been produced by Mr. Jones after he left the employ of the Union Oil Tool Works*. This reamer is known for short in this litigation as the "Jones Removable Bowl Reamer."

Both Mr. Jones and his partner, Mr. Skinner, admit that in October, 1902, they received a notice from Mr. Double and the Union Oil Tool Company that such reamer was claimed to be an infringement upon Mr. Double's inventions, and notifying Jones and Skinner to stop the manufacture. Instead of them asserting that he was the inventor of the Double reamer, Mr. Jones stopped the manufacture and sale of this "Jones Removable Bowl Reamer," acceding to the claim that the latter was an infringement of the Double invention and of the rights of Mr. Double and his company.

It is shown by the record that at no time prior to July, 1915, did Mr. Jones ever assert to anyone that he claimed to be the inventor of the Double reamer. It is shown also that he never made this claim until after he was approached by Mr. Elihu C. Wilson, the president of the defendant in this case, in reference to giving testimony in this case. It was not even then until after Mr. Wilson had made insidious assertions

as to Mr. Jones' alleged rights. Under such circumstances such a stale claim necessarily does not recommend itself to a court of equity. On the contrary it will be viewed and is to be viewed with suspicion and must be proven by the strongest and most positive and convincing proofs.

The trial court had the benefit of hearing the testimony given, of seeing the witnesses, and of even asking questions of some of them, of observing their demeanor on the stand, and under such circumstances the finding of fact by the trial court will not be reviewed unless it is clearly against the great preponderance of evidence or perhaps unless it is entirely unsupported by the evidence.

Adamson v. Gilliland, 37 Sup. Ct. Rep. 169.

Dunkley Co. v. California Canneries Co. Case 2915 decided by the Court

Mr. Jones' assertion in July, 1915, that he was the inventor of the Double reamer is not consistent with any of his acts in 1901, 1902, 1903 or any of the time intervening up to 1915. The record also shows that in 1904 Mr. Jones was manufacturing another form of reamer which he had invented. It is illustrated in the Book of Exhibits, pages 14 to 19, by the patent No. 809,570, issued January 9, 1906. It is known in this record as the "Improved North Reamer." It was an infringement upon the North Patent No. 674,793. (Book of Exhibits p. 162.) Mr. Jones was notified that he was infringing this patent which then belonged to Mr. North and Mr. Double. He sold out this infringement for \$250.00. [Tr. of Record p. 921.] Mr. Jones testifies that at that time he made no claim to either Mr. Double, or to Mr. North, or to Mr.

Double's attorney (complainant's present counsel) that he, Jones, was the inventor of any of the prior Double underreamers. Thus it is shown that twice between 1902 and 1905 Mr. Jones was involved in disputes with Mr. Double in regard to underreamers, underreamer inventions, and the rights to patents therefor, yet he admits that never once during such controversy did he even assert to anyone that he was, or claimed to be, the inventor of the Double reamer.

The testimony of Frederick W. Jones that he had anything whatever to do either with the invention of the Double reamer, or even with the manufacture of the first Double reamer, is in fact *without any corroboration whatever*. It is denied by the testimony of Mr. Edward Double, and contradicted and impeached by the testimony of Charles A. Buffington, W. S. Dinger, W. J. Terriberry and defendant's witness George L. Skinner. Mr. Jones was in the employ of the Union Oil Tool Company, at Santa Paula, California, until July 15, 1901. The first Double reamer was not completed until July 26, 1901. His 1915 assertion, at the instigation of the defendant, of inverting the Double reamer must be most critically examined. As said by the Circuit Court of Appeals for the Eighth Circuit in *Ottomwa Box Car Loader Co. v. Christy Co.*, 215 Fed. 362, 366:

"The testimony of a former employe of a patentee, more than a decade after the date of the patent, that he himself made the invention, and the testimony of others that about the time the device was patented he made statements to that

effect to them, is insufficient to establish that fact in the face of testimony to the contrary of the patentee and other witnesses. Testimony to establish such an anticipation must be clear and conclusive." * * * "The testimony on this issue is therefore conflicting. The legal presumptions, that arising from the patent and that arising from the undisturbed title and use of the patented monopoly by Christy and his successors in interest for more than a decade, are in favor of the claim of the patentee. Christy was the man who was seeking and who needed a box car loader, and Moses was his employe, hired and paid to do as he directed. It is easy for one, employed to construct a machine upon a principle disclosed by his employer, to come to think and to say as he works out the mechanical details, and afterwards to believe and testify, that the invention itself was his. But testimony of this nature produced by an alleged infringer, to destroy a patent unchallenged for years, ought not to prevail unless it is clear and conclusive.

Thomson-Houston Elec. Co. v. Winchester Ave. Ry. Co. (C. C.), 71 Fed. 192, 199;

Eastern Dynamite Co. v. Keystone Powder Co. (C. C.), 164 Fed. 47, 56;

United Shirt & Collar Co. v. Beattie, 149 Fed. 736, 79 C. C. A. 442, 447.

All the testimony upon this issue has been read and weighed, but it fails to convince that Moses was the original inventor of the patented combination, much less to persuade that the court below fell into any error of law or made any such mis-

the
presumption
its finding
upon

take in its consideration of the evidence as can overcome this conflicting evidence was correct.

Warren v. Burt, 58 Fed. 101, 106, 7 C. C. A. 105, 110;

Gorham Mfg. Co. v. Emery-Bird-Thayer Dry Goods Co., 104 Fed. 243, 244, 43 C. C. A. 511, and cases there cited."

In Protector Co. v. John Pell & Son, 204 Fed. 453, 461, the court says:

Syllabus

Opinion

"Testimony that others than the patentee were the real inventors of the thing patented, adduced in an infringement suit to defeat the patent, should be of such dignity and weight as to satisfy the court beyond a reasonable doubt, or it should be unhesitatingly rejected. * * *. Again, it is a rather remarkable circumstance that these men, or the concern with which they have been connected, have bought lasts made under the Baker patent, for the intervening period of four or five years, without protest that Baker was not the inventor, and without claim that either of them was its inventor, or that either of them was in anywise or to any extent connected with its invention.

Testimony of the character under consideration, adduced for the purpose of defeating a patent, should be of such dignity and weight as to satisfy a court beyond any reasonable doubt of its accuracy, or else it should be unhesitatingly rejected. Were the rule otherwise, no patent would be safe against an insidious assault of this character."

The Circuit Court of Appeals for the Eighth Circuit, in *Drum v. Turner*, 219 Fed. 188, says:

“The burden is on him who alleges priority of discovery of an invention which has been patented to another to establish that fact. And where the claim of such priority is first made many years after a patent issued, and it is supported by oral evidence only, *the proof must be beyond reasonable doubt.*”

Mr. Jones is not corroborated by any record evidence whatever. He is not corroborated by any contemporaneous statement or claim. He is testifying fifteen years after the event as to a claim concerning which he has remained silent during all those years. A careful scrutiny of the testimony taken in open court upon this defense will show that Mr. Jones' claim and his testimony is contradicted and impeached on every point by more than one witness. No attempt will be made to exhaustively point out such contradictions and impeachment but the following will serve as examples.

Mr. Jones testifies that he made “some kind of a drawing as to what we wanted. To the best of my knowledge it was me.” [Record p. 887.] “I made the drawing in the office of the company.” [Record p. 891.]

Mr. Double testifies:

“At the time this particular reamer like the drawings of patent No. 796,197 was made in the shop of the Union Tool Company at Santa Paula, Jones was working down in George L. Skinner's shop in Santa Paula. He was in the employ of the Union Oil Tool Company.” [Record p. 956.]

“I first explained the reamer like patent No. 796,197 to Mr. W. F. Dinger and Walter Weekly. They were employees of the Union Oil Tool Company’s shop. Dinger was a blacksmith and Weekly was a machinist. I brought them into my office and started them to build the reamer and gave Mr. Dinger instructions to make the forgings and also instructed Mr. Weekly on some of the machine parts on the body of the reamer. *Jones did no work on that reamer to the best of my knowledge.* That reamer was completed some time in the latter part of July, 1901. Jones left our employ about the 15th of July, 1901. The reamer was sent out in the latter part of July, 1901. At that time Jones was not in our employ nor was he in our employ when that reamer was returned from its first use.” [Record p. 957.]

“I received no suggestions from Fred W. Jones concerning design of underreamer ‘Complainant’s Exhibit Double Patent No. 796,197,’ or ‘Complainant’s Exhibit Double Patent,’ being the patent in suit, No. 734,833.” [Record p. 959.]

“I am able to fix the date of my conception of the invention as June 8, 1901, as that was my testimony in the interference case between Mills and myself. It at that time was very fresh in my mind. I will state under oath that Jones was not present in that office when I conceived the idea of that underreamer on that date.

I had been working on underreamers for some time past and on that particular day I conceived the idea of the underreamer. I made up pencil sketches of an underreamer. I believe I can make sketches of that reamer now.

The Court: The court here takes a recess for five minutes during which time the witness is engaged in making a sketch.

I herewith produce a sketch. I made a number of sketches. I cannot say how many.

Q. 84. Well, were the sketches that pertained to this matter all contained in one view or figure, as we say in drawings, or were they in fragments, scattered over the sheet?

I don't recall, to the best of my knowledge, just the number of sketches I made on that day.

I know that I made a sketch on that day showing all the parts together like this. The sketch was probably destroyed or misplaced. Have not attempted to look for the sketches since. That is since July or August of 1901. Had made sketches of underreamer prior to June 8, 1901.

I first discussed this reamer with Mr. Dinger. That was approximately thirty days after I conceived that reamer. As Mr. Dinger did the first work on the reamer he was naturally the first man I would discuss it with." [Record p. 972.]

"I next discussed it with Mr. Weekly, a few days after discussing it with Mr. Dinger.

Mr. Jones was not employed as a draftsman. He was employed as a machinist with the Union Oil Tool Company, lathe hand.

XQ. 293. (By Mr. Blakeslee.) Well, you at least utilized him as a draftsman, did you not, at times?

A. I did not.

XQ. 204. He did not make any drawings under your suggestion or suggestion for use in the shop while he was there?

A. No drawings, to the best of my recollection.

XQ. 295. *He did not work on any drawings in your office?*

A. *Not to the best of my recollection.*

XQ. 296. You knew he could make drawings, didn't you?

A. I didn't know anything about his ability as a draftsman." [Record p. 984.]

There is therefore a direct contradiction between the testimony of Mr. Double and Mr. Jones. Mr. Jones says he made the sketches and drawings of the first reamer. Mr. Double testifies that he himself made them and showed them to Mr. Dinger and Mr. Weekly. That Mr. Jones did not work on any drawings. Mr. Double says he did not even know anything about Jones' ability to make drawings. Jones claims to have worked on the first reamer. Mr. Double testifies that Mr. Jones was at that time working over at the Skinner shop, across the railroad track, and did no work whatever on the first reamer. Mr. Buffington, Mr. Terriberry and Mr. Dinger corroborate Mr. Double. No one corroborates Mr. Jones.

Mr. W. S. Dinger's testimony is in part as follows:

"Double came to me and stated that he wanted to build an underreamer. Said he had conceived the idea of an underreamer and thought he would go ahead and make it up at the first opportunity we had time. He and I discussed how we would make it up. I don't know whether that was the latter part of June or the first of July of 1901.

I forged the body under Double's instructions.

Q. 38. Did you have any drawings?

A. Well, no, we didn't have any drawings of regular form—blue-prints or anything of that kind

—pencil sketches that Double give us. The forging went to the machine shop where Double was in charge.

I had no conversation with Mr. Jones about it. Weekly turned it up, that is, he did the machine work on the body. Mr. Terriberry assembled it, I believe. I forged the cutters myself. *Jones had nothing to do with making or building of that reamer. At that time Jones was in the Skinner shop.*" [Record p. 991.]

This court must bear in mind that it is dealing with a condensed statement of the testimony in this case. It has not before it the *verbatim* transcript. An attempt has been made in this case to strictly comply with Equity Rule 75. With no opportunity to hear or see the witnesses and with not even an exact record of their testimony before it, this court is not in possession of the same facilities to judge this conflicting evidence as was the trial court. It is for that reason that the general rule is that on questions of fact, where the evidence is conflicting, this court will not review such findings of the trial court.

Charles A. Buffington, in part, testified as follows:

"I will point out 'Complainant's Exhibit Double's First Reamer,' as the reamer to which I have referred as being the first reamer that I worked on in the Union Oil Tool Company's shop.

The first work I did on that reamer was when they were assembling it. The mandrel was too long and had to have about one inch and a quarter cut off of it. Mr. Terriberry and Mr. Gibson were putting it together. *Fred W. Jones was not in the shop at that time. I never saw him in the shop*

about that reamer during July, 1901." [Record p. 995.]

"I do not know when Mr. Jones went over to the Skinner shop in 1901. I cannot state positively that he was working over there on the 14th of July, 1901, when I came to Santa Paula. I saw him working in that shop immediately after. *The first I saw Mr. Jones there was probably thirty days after July 15. Some time long about the middle of August. He was working over there at the time I was, that I got acquainted with him,* and the supposition was around that they told me he was working over there. I couldn't say that I had personal knowledge of his working over there prior to August." [Record p. 996.]

"I should say it was about two or three weeks after I commenced work in the Union Tool Company's shop that the Double reamer was completed. *Did not see Jones in the shop during that time.*" [Record p. 997.]

W. J. Terriberry testified in part as follows:

"Am acquainted with making the first Double underreamer in that shop. The original reamer is here (indicating) and the model is on the other side of it. It was manufactured along the middle of July, 1900, or 1901, at Santa Paula. I did work on it. Gibson, Weekly and Dinger also worked on it. Dinger forged the cutters and the body. He forged two sets of cutters, 9 $\frac{5}{8}$ and 11 $\frac{5}{8}$. That reamer was built under Mr. Double's directions.

Jones had nothing to do with the manufacture of that reamer, because he wasn't in the shop. He was over at Skinner's. Mr. Richardson had nothing to do with the forging of the cutters of that reamer.

Mr. Double gave pencil sketches, told us what he wanted.

Mr. Blakeslee: XQ. 41. Now, do you know anything about these sketches as far as their making was concerned?

A. As far as their making?

XQ. 42. Yes.

A. Well, they are all the sketches I know of are made in the office.

XQ. 43. Yes, but who made them?

A. Double always did make them, everything I know of.

XQ. 44. Did you see him make any sketches there?

A. Well, I have seen him make several.

XQ. 45. Of what?

A. Different work.

XQ. 46. Didn't you see Mr. Jones in the office?

A. Mr. Jones?

XQ. 47. F. W. Jones.

A. No, sir; never saw him in that office to my knowledge.

XQ. 48. Never saw him in the office. What did you ever see Mr. Double make a sketch of?

A. Why, I have seen him make sketches of different parts of work that we were doing there, spears and cutters, one thing and another.

XQ. And what kind of instructions did he give you about this first reamer, Complainant's Exhibit First Double Reamer?

A. Simply to fit them up according to his sketch.

XQ. 57. Were you constantly in touch with the making of this first reamer?

A. Yes.

I testified in the interference suit between Ed-

ward Mills and Edward Double. I identified this same reamer at that time, July 14, 1903. That reamer was built under Double's instructions. *At that time I did not hear any talk by anyone that Fred W. Jones had anything whatever to do with that reamer.*

I was working under Double at that time. Double gave us pencil sketches and told us what he wanted. I did not see Double make those sketches. Double always did make sketches of everything I know of. I have seen him make several sketches. Have seen him make sketches of different work.

I never saw Jones in the office to my knowledge. The first instructions were simply to make them up or fit them up according to his sketch.

I saw Dinger make the body, but Richardson may have made the key or something of that kind that he forged on. *Jones was not in the shop at that time. He left the shop along about the first of July. Somewhere in there. He was over in the Skinner shop. He was working for the Union Tool Company over there, but what time he got through with the Union Tool Company I don't know.*" [Record pp. 988-9.]

Can this court find that the impeached testimony of Mr. Jones convinces it beyond doubt that Mr. Jones and not Mr. Double was the inventor of the first Double reamer and that the trial court was clearly in error in finding that Mr. Double was the inventor? The more time and the more critical examination given by this court to the record on this issue, the more certain complainants are that this court will agree that instead of the testimony proving the claims now as-

serted by Mr. Jones, after his years of silence, the record conclusively proves that Edward Double invented that reamer. However, it is to be noted that only certain features of the Double invention in suit are present in that first reamer. It was the second reamer built in 1901 which was like the drawings of the patent in suit. It was to this second reamer that Mr. Jones referred in his testimony in the *Mills v. Double* interference when he said that during the manufacturing of this first Double reamer Mr. Double said to him that it was a mean thing to manufacture and that he would change the construction of it, and showed him what changes he, Mr. Double, proposed to make and asked what he, Jones, thought of such changes. Mr. Jones' testimony at the trial of this case does not agree at all with his interference testimony. Asked at the trial whether at any time during 1901 he discussed with anybody such underreamers as those disclosed in the Double patent here in suit, Mr. Jones says: "I don't remember about that." [Record p. 898.] Later, however, Mr. Jones says that he discussed with Mr. Double the dovetail part of such reamers like the dovetail part of the cutters in the patent in suit. That it must have been before he left the shop. [Record p. 899.] (Jones left the employ of the Union Oil Tool Company entirely July 15, 1901, and he was employed at the Skinner shop for that company from June, 1901, on.) Mr. Jones does not testify that he had anything whatever to do with either the inventing of the second Double reamer made in 1901,—the one like the patent in suit. He does not even pre-

tend he was in the employ of the company while it was manufactured.

The Jones "Round Nose" and the Jones "Removable Bowl Reamers."

In defendant's brief much reliance is evidently placed upon the Jones so-called "Round Nose" reamer as limiting the scope of the Double invention. Here again defendant mistakes its premise. The Jones round nose reamer does not contain a single one of the combinations common between the Double invention and defendant's infringing reamers. The Jones "Round Nose" reamer does not anticipate the Double invention or in the slightest degree limit its scope. The principle of the two reamers are separate and distinct.

However, the Jones "Round Nose" reamer was only a dream. It was another of the ephemeral experiments. Mr. Jones himself admits that he abandoned it. It was unsuccessful and Mr. Jones abandoned it and turned his attention to the Jones "Removable Bowl" reamer. Referring to the "Removable Bowl" reamer, Mr. Jones says:

"I commenced making that after we abandoned the other one." [Record p. 908; see also pp. 924-925, XQ. 484-491.]

On redirect examination by defendant's counsel, the following is Mr. Jones' testimony:

"RDQ. 550. You have stated that you abandoned the manufacture of the round nose type of reamer prior to taking up the manufacture of the removable bowl type reamer. Was there any reason other than the receipt by you of that notice

of threat of infringement leading you to abandon such round nose type reamer manufacture?

A. *Yes.* They did not prove to be a perfect success, although they were used. But they gave more or less trouble in getting them down the casing and so I invented the other reamer on account of it being a better reamer and done away with the difficulty of getting it through the casing.”
[Record p. 935.]

This testimony proves this round nose reamer to have been a mere abandoned experiment. In the language of this court in *Parker v. Stebler*, 177 Fed. 210:

“It was a disappointment to Jones and was a failure and was discarded by him.”

Further, the proofs in regard to the alleged production of this Jones “round nose” reamer do not measure up to the requirements of the law in regard to proving “prior use” or “prior invention.” It is totally unproven except by the verbal testimony of Mr. Jones. There is no proof that it was ever used by any one. There is no proof that Mr. Jones ever sold one of the “round nose” reamers. The only proof is that he contrived it, made a wooden model of it, and abandoned it in favor of another construction which he thought would be operative and better.

“The defense of anticipation is not made out where the alleged anticipatory process or machine is inoperative or a failure, while that of the patent is operative and successful, even though the same devices or parts are used, but combined in a new way.”

Syllol
See p
777

Kirchberger v. American Co., 124 Fed. 764.

It was therefore incumbent on defendant in order to make the so-called Jones "round nose" reamer a total or partial anticipation (thus limiting the scope of the Double invention), to show that it was a success and that it became in fact a part of the public knowledge. A mere abandoned experiment can have no such limiting effect. The defense of the Jones "round nose" reamer is the defense of "prior use" or of "prior public knowledge." This defense is an affirmative one and must be proven beyond reasonable doubt.

Parker v. Stebler, 177 Fed. 210.

In this connection it should be borne in mind that Mr. Double has testified that he had never heard of or seen either a drawing or model of the Jones "round nose" reamer until after Jones had left the employ of the Union Oil Tool Company. The trial court has distinctly shown that it places confidence in Mr. Double's testimony and that it did not believe the impeached story of Mr. Jones. Yet Mr. Jones stated in 1903 that Mr. Double "showed me what changes he proposed to make, and he also asked me what I thought of the changes, and I told him that I thought the change was a good one," before he left the employ of the Union Oil Tool Company in 1901.

From any viewpoint this Jones round nose reamer has no place in the art and has no effect in this suit as limiting in any degree the scope of the Double invention or patent. It can serve only to point out the importance of the Double invention,—as do the unsuccessful efforts of O'Donnell & Willard, North, Kellerman, and the many others.

The admission of Frederick W. Jones that his "round nose" reamer was not a satisfactory tool and that he abandoned it for that reason and invented his "Removable Bowl" reamer conclusively shows that such "round nose" reamer was a mere abandoned experiment having no place in the practical art and that it can have no effect as a limitation of the scope of the Double invention.

Disregarding, however, such admission, the testimony produced to prove such "round nose" reamer does not measure up to the requirements of the law and cannot be held to establish such defense.

"It is well settled that the defense of prior use must be established by evidence which proves it beyond reasonable doubt. The question of novelty is a question of fact."

Turrill v. Railroad Co., 1 Wall. 491.

"And it has been held that the oral testimony of many witnesses, if unsupported by any evidence consisting of documents or things, must be very reasonable or very strong to establish the defense of prior use."

The Barbed Wire Patent, 143 U. S. 275;

Deering v. Winona Harvester Works, 155 U. S. 286.

In Cantrell v. Wallick, 117 U. S. 689, 6 Sup. Co.

the first inventor of the device described in the letters patent and of its

It was therefore incumbent on defendant in order to make the so-called Jones "round nose" reamer a total or partial anticipation (thus limiting the scope of the Double invention), to show that it was a success and that it became in fact a part of the public knowledge. A mere abandoned experiment can have no such limiting effect. The defense of the Jones "round nose" reamer is the defense of "prior use" or of "prior public knowledge." This defense is an affirmative one and must be proven beyond reasonable doubt.

Parker v. Stebler, 177 Fed. 210.

In this connection it should be borne in mind that Mr. Double has testified that he had never heard of or seen either a drawing or model of the Jones "round nose" reamer until after Jones had left the employ of the Union Oil Tool Company. The trial court has distinctly shown that it places confidence in Mr. Double's testimony and that it did not believe the impeached story of Mr. Jones. Yet Mr. Jones stated in 1903 that Mr. Double "showed me what changes he proposed to make, and he also asked me what I thought of the changes, and I told him that I thought the change was a good one," before he left the employ of the Union Oil Tool Company in 1901.

From any viewpoint this Jones round nose reamer has no place in the art and has no effect in this suit as limit

vention

import

success

Kellerman, and the many others.

The admission of Frederick W. Jones that his "round nose" reamer was not a satisfactory tool and that he abandoned it for that reason and invented his "Removable Bowl" reamer conclusively shows that such "round nose" reamer was a mere abandoned experiment having no place in the practical art and that it can have no effect as a limitation of the scope of the Double invention.

Disregarding, however, such admission, the testimony produced to prove such "round nose" reamer does not measure up to the requirements of the law and cannot be held to establish such defense.

"It is well settled that the defense of prior use must be established by evidence which proves it beyond reasonable doubt. The question of novelty is a question of fact."

Turrill v. Railroad Co., 1 Wall. 491.

"And it has been held that the oral testimony of many witnesses, if unsupported by any evidence consisting of documents or things, must be very reasonable or very strong to establish the defense of prior use."

The Barbed Wire Patent, 143 U. S. 275;

Deering v. Winona Harvester Works, 155 U. S. 286.

In Cantrell v. Wallick, 117 U. S. 689, 6 Sup. Co. 970, 29 L. Ed. 1017, the court said:

"The burden of proof is upon the defendants to establish this defense. For the grant of letters patent is *prima facie* evidence that the patentee is

the first inventor of the device described in the letters patent and of its novelty.”

And in the Barbed Wire Patent case the court said:

“The frequency with which testimony is tortured or fabricated outright, to build up the defense of prior use of the thing patented, goes far to justify the popular impression that the inventor may be treated as the lawful prey of the infringer.”

A reading of the testimony of Mr. Jones [Record pp. 907 to 913] shows a mass of contradictions by Mr. Jones of his own testimony. It shows that he is uncertain and indefinite as to when he produced the “round nose” reamer or when he produced the “removable bowl” reamer, and uncertain as to when he commenced manufacturing either of these. He says he “cannot remember” whether it was in the fall of 1902 that he first manufactured a “removable bowl” reamer; that he “don’t remember” how long after it was he left the Union Oil Tool Company before he commenced the manufacture of this reamer; that he “don’t remember whether they made any of these in 1901.” He says: “I have nothing to refer to to establish the date.”

On direct examination Mr. Jones says that he made a small model of the “round nose” reamer about the time when the first Double reamer was being made [Record p. 894]; that he could not give the month. He says: “I only can remember that it was about the time that my mind was pretty well occupied with underreamers, and it was along in that time of the spring and summer of 1901.” He says: “I don’t know but

what Mr. Double saw it; I believe he did. It is the best of my recollection I did see it, and I showed it to him." [Record p. 896.]

It is to be noted that Mr. Jones does not even positively testify that Mr. Double ever saw the model of the "round nose" reamer before the Double reamer (like the drawings of the patent in suit) was completed by Mr. Double at Santa Paula. Mr. Double point blank testifies that he never saw this model and did not see the "round nose" reamer until after Jones was over in business with Skinner and after Double's second reamer had been completed.

The Supreme Court of the United States in *Luco v. United States*, 64 U. S. 515, says:

"There are many more satisfactory tests of the truth of parol testimony than that of character of the witnesses. Where the facts sworn to are capable of contradiction, they may be proved by others not to be true; and when they are not, the internal evidence is often more convincing than any other. A shrewd witness who is swearing falsely to something which cannot be disproved by direct testimony, will confine his recollection wholly to that single fact, professing a want of recollection of all the facts and circumstances attending it. An inexperienced witness, whose willingness to oblige his friend exceeds his judgment, will endeavor to give verisimilitude to his tale by a recital of imaginary circumstances. A stringent cross-examination will generally involve the latter in a web of contradictions, which will be in a measure evaded by the other, with the answer that 'he does not recollect.' When many witnesses are

produced to the same facts, and they contradict one another in material circumstances, they prove themselves unworthy of credit.”

As said in *Eck v. Kutz*, 132 Fed. 763:

“But the complainant is a highly interested witness, and his son is not much better; nor does the cam cylinder prove anything by itself, however primitive, being adaptable to whatever date may be assigned to it. The earlier date contended for rests, therefore, upon the mere say so of the father and son without any corroboration²⁹ or convincing circumstances, which hardly fulfills the high degree of proof required when the date of an invention is material in order to escape anticipation. *Clark Thread Co. v. Williamantic Linen Co.*, 140 U. S. 481; *Westinghouse Electric & Mfg. Co. v. Saranac Lake Erie Light Co.*, 108 Fed. 231.”

The testimony fails to prove that Edward Double had any knowledge whatever of either of the Jones reamers prior to the production by him of the invention of the patent in suit. Neither of such Jones reamers was in fact prior to Mr. Double's invention and the trial court was clearly correct in finding against defendant upon all of the issues raised by the Jones testimony.

The Double Invention and the Patent in Suit.

The patent in suit is reproduced on pages 2-6 of the Book of Exhibits. It is most ably and succinctly explained by complainants' expert, Arthur P. Knight. Mr. Knight was formerly an examiner in the United States patent office and has spent a lifetime in me-

chanical and electrical pursuits and in the investigation of machinery and inventions. His testimony as an expert in patent cases has often been before this court. Mr. Knight testifies:

“The Double patent 734,833 relates to an under-reamer, that is to say, to a tool which is adapted to be lowered through a well casing and is provided with cutters which are adapted to expand on passing below the lower end of the casing so as to enable the reaming out of the hole below the casing to a sufficient diameter to allow the casing to descend. On account of the thickness of the casing this hole must be reamed to a diameter larger than the inside of the casing, and in order to enable the casing to perform this function and yet permit the tool to be lowered through the hole, it is necessary to so construct the tool that the cutters may be collapsed or contracted while the tool is being passed down through the casing. The construction disclosed in the patent for this purpose consists of or comprises a hollow body provided with a downward extension, in which are mounted tilt slips, said tilt slips being adapted to move or slip vertically and to tilt; and the downward extension of the body being provided with means for engaging the tilt slips to control their collapsing and expanding movement. Said means consists of shoulders or faces on the tilt slips and on the downward extension which engage in the relative sliding movement of the tilt slips to force the lower ends of the tilt slips outwardly as said tilt slips are raised, these lower ends constituting the cutting portions of the tilt slips. The upward slipping movement of the tilt slips is effected by a spring enclosed in the hollow body and bearing

against the shoulder thereon, and operating on the rod, 11, carrying a key indicated at 17, which engages in key seats, 16, in the respective tilt slips. Said key seats being large enough to allow the tilt slips to tilt on the key. Shoulders, 8, are provided at the sides of the downward extension forming thrust-bearings against which the upper ends of the tilt slips engage when in their uppermost or working positions. Slipways are provided on the downward extension of the hollow body between which the tilt slips slip up and down, these slipways furnishing lateral support for the tilt slips; and being provided with dovetails or flanges, and adapted to engage with corresponding dovetails or flanges on the tilt slips when the tilt slips are in working position, to resist any outward strains on the cutters. Above the spreading-bearings, or shoulder portions, the downward extension is provided with bearing faces described in the patent as 'oppositely arranged parallel bearing faces' which are adapted to engage with the tilt slips to resist any inward strains of the cutters. The normal or working position of the parts is shown in Figure 1 of the patent. In this position the tilt slips are at the upper ends of their stroke, the upward movement being arrested by the engagement of the upper ends of the tilt slips with the shoulders, 8, on the body, 1; and the tilt slips being held in this position by the spring, 10, pressing upwardly on the rod, 11, and acting through the key, 17, engaging in key-seats, 16, in the tilt slips to hold the tilt slips upwardly to this position. The bearing portions, or 'inward projections,' 18, on the cutters which face inwardly or toward the axis of the tool bear against the flat parallel bearing faces on the downward extension and hold the

lower ends of the tilt slips outwardly. In this position the dovetails on the slipways engage with the dovetails on the tilt slips so as to limit the outward movement of the tilt slips, and each tilt slip is therefore firmly held against vertical upward strain which is taken by the shoulder, 18, against inward strain which is taken by the parallel bearing face of the downward extension, against outward strain which is taken by the dovetails, and against lateral strain which is taken by the faces of the slipways. In this position the cutting edges at the lower ends of the tilt slips are projected to a greater diameter than the body of the tool, and are adapted to ream a hole larger than the casing or the shoe at the lower end of the shoe, as illustrated in Figure 1. When the underreamer is to be withdrawn from the well the tool is pulled upwardly; the slips come in contact at their shouldered portions shown on their outer faces with the bottom of the shoe so that further upward movement of the tilt slips is temporarily arrested, and as the tool continues to be drawn upwardly the parallel bearing faces on the downward extension of the body slide upwardly between the bearing faces, 18, on the tilt slips until the shoulders or spreading-bearings, 25, on the downward extension reach the upper faces or shoulders of the bearings or projections, 18, on the tilt slips; whereupon the inward pressure on the tilt slips due to the engagement of the shoe therewith forces the tilt slips inwardly; the said faces, 26, riding in on the spreading-bearings, 25, until the parts assume the collapsed position shown in Figure 3. In this collapsing action the tilt slips bear, or have a fulcrum, at or near their upper ends on the flat parallel bearing faces; and the pressure of the shoe

is exerted inwardly on the outer faces of the tilt slips somewhat below this fulcrum, but at a considerable distance above the lower or cutting ends of the tilt slips, so that even a limited movement of the portion of the tilt slip which engages the shoe will produce a comparatively large throw of the cutting edges. Moreover, in this collapsing action the tilt slips remain engaged laterally with the slipways; said slipways serving as means for holding the tilt slips against lateral movement in collapsing and expanding actions as well as in working position. In order to provide for the lateral support given by these slipways at each side of the tilt slips, while enabling the outside bearing on the tilt slips by the shoe to be raised as high as possible, so as to give a great inward throw in collapsing, the downward extension is slotted or cut away to allow the outer faces of the tilt slips to project out through the slots between the slipways so as to be adapted to engage the shoe at a point above the lower ends of the slipways. *The bearing of the shoe against the outside of the tilt slips is at a point above the bearing of the bearing face, 18, on the tilt slips with the flat parallel bearing faces on the downward extension of the body so that in the collapsing action by engagement with the shoe, the upper as well as the lower portions of the tilt slips are held inwardly by such pressure of the shoe, and as the tilt slips slide downward relatively to the downward extension and slipways thereon, the dovetails or flanges, 29, on the tilt slips immediately leave the dovetails or flanges on the slipways.* When the underreamer with the tilt slips collapsed as shown in Figure 3 is moved downwardly in the casing so as to pass beneath the shoe, the above described operation is

reversed; the spring, 10, which has been compressed in the collapsing operation, tending to draw the tilt slips upwardly and causing the upper faces, 26, on their bearing portions or projections, 18, to ride or slide outwardly on the spreading-bearings, 25, causing the cutting portions of the lower ends of the tilt slips to be expanded outwardly, until said bearing portions or projections, 18, ride onto the flat parallel bearing faces of the downward extension; whereupon the tilt slips move directly upward until their upper ends strike the thrust-bearings or shoulders, 8, and dovetails or flanges, 29, come into contact with the dovetails on the slipways. These dovetails, therefore, do not come into action in the normal and expanding and collapsing operation except when the tilt slips are fully expanded in the position shown in Figure 1. If, however, for any reason, an inward pressure is exerted on the lower ends or cutting edges of the tilt slips, and at the same time the body of the tool is drawn upwardly with respect to the tilt slips, so as to cause the tilt slips to slip downwardly, relative to the downward extension of the body, these dovetails come into operation by reason of a taper or inclination thereof which permits the upper ends of the dovetails or flanges on the tilt slips to swing outwardly to a limited extent, as they slip downwardly into wider portions of the slipways between the tapered dovetails. This action, however, cannot occur unless there is an inward pressure on the lower ends of the cutters. This action takes place while the bearing faces or projections, 18, of the tilt slips are in engagement with the flat parallel bearing-faces of the downward extension, and permits the lower ends or cutting portions of the tilt slips to move slightly

inward with inward pressure thereon by outward displacement of their upper ends. This action, however, can only take place in case there is an inward pressure on the lower ends of the tilt slips below the bearings of the tilt slips by projections, 18, thereof on the flat parallel bearing faces, and cannot occur in normal collapsing operation by engagement of the shoe, as it is essential to the principle of operation of this patent that the bearing on the shoe should be at a considerable distance above the cutting edges so as to provide for sufficient inward throw in collapsing to effectively clear the cutting edges from the casing. The essential features of the Double underreamer are a hollow body containing the spring and rod for pulling the tilt slips upwardly in normal working position, said rod being provided with a key, and said hollow body being provided with a downward extension in which the tilt slips are slidably and tiltingly mounted, the tilt slips hung on said key on the rod, and the shoulders or bearing faces on the tilt slips and downward extension of the body which cause the lower ends or cutting edges of the tilt slips to be spread outwardly as the tilt slips are moved upwardly by the spring-actuated rod. A further feature of the reamer shown in this patent is the provision for a thrust-bearing at the upper ends of the tilt slips, an inside bearing at the lower portion of the tilt slips for resisting inward movement of the cutters, side bearings (slipways) for resisting lateral movement, and outside bearings (dovetails) for resisting outward movement of the cutters, these lower inside bearings being above the spreading-bearings aforesaid on the downward extension, so that in the upward movement of the tilt slips to expanded position they

ride onto these inside thrust-bearings after they pass or leave the spreading-bearing. A further feature of the underreamer shown in this patent is the provision for the projection of portions of the tilt slips through slots or spaces between the slipways on the downward extension of the body, so as to enable the shoe to bear on the tilt slips at a point sufficiently near the fulcrum of said tilt slips at or near their upper ends to give a magnified or enlarged inward throw to the lower cutting edges of the tilt slips, while presenting the lateral and outside thrust-bearings for the tilt slips due to the extension of the downward extension of the body alongside of the tilt slips when in working position. A further feature of the underreamer shown in this patent is the inclination or taper of the dovetails on the tilt slips and downward extension of the body, permitting collapsing movement when, for any reason, an inward pressure is brought upon the lower ends or cutting edges of the tilt slips concurrently with an upward pull on the tool.

Another feature of the underreamer shown in this patent is the special means provided for facilitating assemblage of the parts by making the key on the spring-actuated rod removable and notching the said key so as to engage with the spring-actuated rod so as to hold the key in position in normal operation." [Record pp. 673-681.]

In the patent in suit Mr. Double has complied with the requirements of section 4888, R. S. U. S., which requires that in securing a patent an inventor "in case of a machine, shall explain the principle thereof and *the best mode* in which he has contemplated applying that principle so as to distinguish it from other inven-

tions.” The drawings and description, which Mr. Double filed as a part of his application, referred to the best form of embodiment of his invention. In other words, to what he then believed to be the preferred embodiment thereof. By the very theory of this section of the patent law *he is not supposed to show all of the ways* in which his invention could be embodied in a machine, nor is he supposed to be limited to the exact construction or exact interrelation of parts shown or described by him. He is required to explain the principle of his invention and the best mode in which he has contemplated applying the principle, and he is then required to “particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery.”

In construing a patent or the claims of a patent, the question is not the words or technical terms or untechnical terms used by the inventor in the specification or claims, but as said by the Circuit Court of Appeals in *Carlson Motor & Truck Co. v. Maxwell-Briscoe Motor Co.*, 197 Fed. 309-315:

“The question is not one of nomenclature, but of mechanics, and relates not to the names given to the parts of the combination, but to the various functions they perform.”

As said by the Supreme Court in *Bates v. Coe*, 98 U. S. 31:

“Sufficient has already been remarked to show that the invention, in its primary feature, is an improved machine for drilling, composed of the devices pointed out in the specification, which op-

erate and perform the functions therein described, and which by their joint operation in the manner described accomplish the patented result.

Where there is only one combination of an entire character, incapable of division or separate use, the defenses of the kind mentioned must be addressed to the invention.

Devices in one machine may be called by the same name as those contained in another, and yet they may be quite unlike, in the sense of the patent law, in a case where those in one of the machines perform different functions from those in the other. *In determining about similarities and differences, courts of justice are not governed merely by the names of things, but they look at the machines and their devices in the light of what they do or what office or function they perform, and how they perform it, and find that a thing is substantially the same as another, if it performs substantially the same function or office in substantially the same way to obtain substantially the same result; and that devices are substantially different when they perform different duties in a substantially different way, or produce substantially a different result. Cahoon v. Ring, 1 Cliff. 620."*

It is, therefore, necessary in properly construing a patent not to be governed by the terms employed in the inventor's specification, or by the names given to the elements, but to analyze the invention, ascertaining how the several elements co-operate with each other to produce the desired results, and then to ascertain whether in the infringing device there have been used substantially equivalent elements in substantially equivalent relations, performing substantially the same func-

tions in the device or machine in substantially the same manner.

Mr. Knight explains the Wilson and Wilson improved reamers and compares the same with the Double patent and invention as follows:

“ ‘Complainants’ Exhibit Wilson Reamer’ comprises a hollow body having a downward extension provided with slipways in which tilt slips are mounted to slip vertically and to tilt so as to collapse or expand at their lower ends; said downward extension and said tilt slips being provided with interengaging portions for causing the lower ends of the tilt slips to spread out as the tilt slips slide upwardly. Said tilt slips are drawn upwardly in slipways by a spring-actuated rod extending within the hollow body, and provided with a cross piece at its lower end serving as a key and engaging in key seats or recesses in the inner faces of the tilt slips, so that the tilt slips are hung or suspended on said spring-actuated rod. In this underreamer the spring which actuates the rod rests on a block which is held in fixed position in the hollow body by screw threaded pins screwed into the sides of the hollow body and projecting into said block. At the upper end of the slipways the body is formed with thrust-shoulders against which the upper ends of the tilt slips engage when in working position. The lower portion of the said block in the hollow body serves as an inside bearing for the upper end portions of the tilt slips when in working position. At the lower end of the downward extension are provided the inclined spreading-bearings which engage the shoulders on the tilt slips to expand the tilt slips; and above these spreading-bearings the downward extension

is provided with bearing faces which are slightly inclined or downwardly tapered and which engage bearing faces on the tilt slips to form inside thrust-bearings for the tilt slips. The slipways in this underreamer are formed with dovetails or flanges engaging dovetails or flanges on the tilt slips to form outside bearings for the tilt slips when in expanded working position. The shanks of the tilt slips extend through a slot or space between the dovetails or side walls of the tilt slips so as to be exposed for contact with and operation by the shoe at the bottom of the casing at a point which is above the lower end of the downward extension and of the slipways.

In this underreamer, therefore, as well as in the underreamer disclosed in patent 734,833, I find an underreamer body which is made hollow to receive a spring-actuated rod, *and which is provided at its lower end with a downward extension in which the slipways are mounted to slip vertically and to tilt inwardly and outwardly, and said tilt slips being hung or suspended on said spring-actuated rod to be drawn upwardly thereby, and said downward extension being provided with spreading-bearings engaging with portions of the tilt slips to expand the tilt slips as they are drawn upwardly.*

I also find in this underreamer, as well as the underreamer disclosed in patent 734,833, slipways, in which the tilt slips move and are retained against lateral displacement; thrust-bearings at the upper ends of said slipways against which the upper ends of the tilt slips engage when in working position; inside thrust-bearings constituted by the slightly inclined or tapering faces directly above the spreading-bearings in this under-

reamer, 'Complainants' Exhibit Wilson Reamer,' and constituted by the lower portions of the flat parallel bearing faces on the downward extension in the said patent; and outside bearing faces constituted by the dovetails in the slipways and on the tilt slips; and an upward inside bearing face constituted by the lower portions of the block within the hollow body in 'Complainants' Exhibit Wilson Reamer,' and constituted by the upper portions of the flat parallel faces on the downward extension in the patent.

I also find in 'Complainants' Exhibit Wilson Underreamer,' as well as in the reamer shown in patent 734,833, a hollow body having a downward extension provided with slipways slotted to permit portions of the tilt slips to project or extend from the slipways outwardly between the dovetails or sides of the slipways so as to contact with the shoe at the lower end of the casing and to provide for such contact at a point which is considerably above the lower ends of the slipways and of the downward extension. *I do not find in 'Complainants' Exhibit Wilson Reamer' parallel bearing faces on the downward extension and tapering dovetails in the slipways, inasmuch as the inside thrust-bearings directly above the spreading-bearings, on the prongs or parts of the downward extension in this underreamer, taper slightly downward; and the dovetails in the slipways are parallel to the axis of the body. As regards their function as thrust-bearings the deviation from parallelism in these bearings on the downward extension is not sufficient to permit or cause any downward movement of the tilt slips due to inward pressure thereon, so that these faces are effective in holding the tilt slips outwardly in normal working posi-*

tion; and are, therefore, considered with regard to this function, substantially although not actually parallel with the axis of the body, as their deviation from parallelism is not sufficient to affect their action as thrust-bearings in the normal working position of the parts. Considering their action as sliding faces, when the cutters are being drawn down in the slipways, these bearing faces permit of a slight inward movement of the lower ends of the tilt slips as they descend. When this downward movement of the tilt slips is effected by pressure of the shoe thereon this slight inward movement of the tilt slips is without any substantial effect, as it is not until the shoulders on the tilt slips reach and pass onto the spreading-bearings that the inward movement becomes sufficient to enable the tool to be drawn up in the casing. If the relative downward movement of the tilt slips is due to pressure imposed on their lower ends, these spreading-bearings will co-operate with the parallel-faced dovetails in 'Complainants' Exhibit Wilson Reamer' in such manner that the inner ends or cutting portions of the tilt slips are released from such pressure as they move downward. In the underreamer shown in patent 734,833, the downward movement of the tilt slips accompanied by pressure on their lower ends results in the lower cutting portions of the tilt slips being allowed to move inwardly as the tilt slips move down; this movement being permitted by the taper of the dovetails, so that as regards this effect of releasing the cutting edges, when pinched together, the tapering bearing faces of the downward extension in correlation with the parallel dovetails in 'Complainants' Exhibit Wilson Reamer' have substantially the same effect as the parallel

bearing faces and the tapering dovetails in the underreamer shown in Double patent 734,833. I do not find in 'Complainants' Exhibit Wilson Reamer' the removable key detachably seated on the spring-actuated rod and constituting one feature of the underreamer shown in Double patent 734,833. In regard to its function of serving as a means of hanging or suspending the tilt slips on the spring-actuated rod, this function is identical and performed in the same manner by a cross-piece in 'Complainants' Exhibit Wilson Reamer' as it is by the key in the Double patent 734,833. In regard to the function of removability of the key in facilitating the assemblage of the parts, this special function I do not find in 'Complainants' Exhibit Wilson Reamer.' Instead of making the key removable, so as to enable the tilt slips to be hung onto the spring-actuated rod after the rod is inserted in the hollow body, the Wilson structure provides tilt slip suspending means which is integral with the spring-actuated rod and provides removable means for supporting the spring-actuated rod in the hollow body, so that the tilt slips may be assembled on the spring-actuated rod, the latter then shoved up into the hollow body and held in place by the releasable or detachable supporting means consisting of screw pins engaging in the block in the hollow body.

In 'Complainants' Exhibit Wilson Underreamer No. 2,' I find substantially the same construction and correlation of parts as in 'Complainants' Exhibit Wilson Reamer' except in respect of the means for supporting the spring-actuated rod in the hollow body and for furnishing the upper inside bearing for the tilt slips. In this Wilson underreamer No. 2 the spring-actuated rod is

provided with a key-way through which extends a key seated in the walls of the hollow body, said key engaging the lower ends of the spring to support the same and thereby hold the spring-actuated rod in position. The lower portion of this spring-actuated rod in this Wilson underreamer No. 2 is provided with flat faces directly above the cross-piece or key portions thereon to serve as inside upper bearing faces for the tilt slips. A key engaging the spring as above stated performs the same function as the block within the hollow body in 'Complainants' Exhibit Wilson Reamer' and as the shoulder within the hollow body of the Double patent 734,833. The flat bearing portions on the lower portion of the spring-actuated rod, in 'Complainants' Exhibit Wilson Underreamer No. 2,' directly above the key projections thereon, serve the same purpose as the lower portions of the block within the hollow body of 'Complainants' Exhibit Wilson Reamer,' and the same purpose as the upper portions of the flat parallel bearing faces on the downward extension in Double patent 734,833.

I, therefore, find in underreamer shown in Double patent 734,833, in 'Complainants' Exhibit Wilson Reamer,' and in 'Complainants' Exhibit Wilson Underreamer No. 2,' and in each and every one of them: A hollow body; a spring-actuated rod mounted within the hollow body, and said spring being supported by the hollow body so as to tend to draw said rod upwardly; tilt slips mounted to slip vertically and to tilt inwardly and outwardly in a downward extension of said hollow body and hung on said rod so as to be drawn upwardly by said spring; and spreading-bearings on said downward extension engaging with parts

on the tilt slip to expand the tilt slips and spread their lower cutting edges apart as the tilt slips are forced upwardly into working position by said spring. The stated parts co-operate to expand the tilt slips to cutting or working position when it passes below the shoe and to collapse the cutters to enable them to pass within the casing as it passes up within the shoe in the same manner and by the same mode of operation in the said patent, in 'Complainants' Exhibit Wilson Reamer' and in 'Complainants' Exhibit Wilson Underreamer No. 2.' I also find in the underreamer shown in Double patent 734,833, in 'Complainants' Exhibit Wilson Reamer,' and in 'Complainants' Exhibit Wilson Underreamer No. 2,' the tilt slips vertically and tiltingly movably in slipways on the downward extension of the body; the said slipways being provided with dovetails which co-operate with dovetails on the tilt slips to furnish outside bearings for the tilt slips; said tilt slips engaging at their upper ends with thrust-bearings on the body and having inside upper bearings in fixed relation to the body as regards inward movement, and having lower inside bearings which take the inthrust due to inward pressure on the cutting edges; said inside lower bearings being directly above the spreading-bearings on the downward extension of the body, so that in each case the tilt slips are firmly held when in working position against upthrust, lateral thrust, inthrust, and outthrust; and in this respect the stated parts of the said patent and of 'Complainants' Exhibit Wilson Reamer' and 'Complainants' Exhibit Wilson Underreamer No. 2,' operate by the same mode of operation.

I also find in each of these exhibits, Double Patent No. 734,833, 'Complainants' Exhibit Wilson

Reamer,' and 'Complainants' Exhibit Wilson Underreamer No. 2,' *the downward extension slotted to permit portions of the tilt slips to extend outwardly from the slipways through the sides of the tool to engage with the casing and with the shoe at a point considerably above the lower ends of the slipways and of the downward extension so as to provide for a considerable inward and outward throw of the cutting edges of the tilt slips*, so as to remove the cutting edges from the casing when they are collapsed, sufficiently to insure that the cutting portions will be free from any obstructions in the casing when the tool is being lowered in the casing. In this respect the parts of the underreamer shown in the Double patent 734,833, and 'Complainants' Exhibit Wilson Reamer' and 'Complainants' Exhibit Wilson Underreamer No. 2,' have the same relation of parts and the same mode of operation.

In respect to the taper of the dovetails and the flat parallel bearing faces in Double patent 734,833, I find that the straight or parallel dovetails and the slightly inclined inner thrust-bearings on the lower portions of the downward extension or prongs, of 'Complainants' Exhibit Wilson Reamer' and 'Complainants' Exhibit Wilson Underreamer No. 2,' have an equivalent relation and equivalent mode of operation to that of the stated parts in the said Double patent. I find that instead of the removable key shown in the Double patent and the integral shoulder on the hollow body shown in said patent, that there have been substituted in 'Complainants' Exhibit Wilson Reamer' and 'Complainants' Exhibit Wilson Underreamer No. 2,' an integral key or tilt slip engaging means on the spring-actuated rod, and a releasable means on the

hollow body for supporting the spring; while the purpose and result of these are the same in either case, namely, to facilitate or enable the insertion and withdrawal of the parts, the mode of operation in this respect is not the same.

'Defendant's Exhibit Wilson Patent 827,595' shows and describes an underreamer which is substantially the same as 'Complainants' Exhibit Wilson Reamer,' the only difference being in minor details of construction as follows: The bearing block forming a seat or shoulder for the actuated spring to rest on is shown at 7 in the said patent in the form of a round block, and is held in place by means of two dowel-pins, 8; whereas, the corresponding block in 'Complainants' Exhibit Wilson Reamer' is squared at its lower end and is held in place by screw pins.

The squaring of the lower end of this block gives a better inside upper bearing for the tilt slips, *but the principle of action and the mode of operation are the same in the patent and in 'Complainants' Exhibit Wilson Reamer' irrespective of this change in the block.* The only other difference I find is a slight difference in the shape of some of the bearing faces and shoulders on the tilt slips. The rounding shown at shoulder 16 in Figures 8 and 9 in said patent not being noticeable in 'Complainants' Exhibit Wilson Reamer,' which has, however, a perceptible rounding of the inwardly and upwardly directed corner or shoulder which is adapted to slide on the spreading-bearings, this rounding corresponding in function to the rounding of bearing 16 as set forth in the first six lines of page 2 of the Wilson patent. The principles of action and mode of operation of these parts, as well as all the other parts of the under-

reamer, are the same in 'Complainants' Exhibit Wilson Reamer' and in 'Defendant's Exhibit Wilson Patent.'

The construction of 'Complainants' Exhibit Wilson Reamer' being substantially the same as that shown in 'Defendants' Exhibit Wilson Patent,' I will identify the parts of the Wilson reamer by reference to the drawings and specifications of said patent. In the Double patent the thrust-bearings on the body are indicated at 8 in the drawings, and are referred to as shoulders in the specification. In the Wilson patent these thrust-bearings are indicated at 10 in the drawings, and are referred to as 'down-thrust bearings' 10 in the specification. The downward extension in the Double patent includes all those parts in integral and fixed relation with the body and extending beneath the shoulders or bearings 8; this extension being differentiated from the body proper by reason of its being cut away or slotted to receive the tilt slips and the means for supporting and operating the same; in other words, it includes all those parts which extend downwardly from and are in fixed relation with the body, 1, of the under-reamer. It, therefore, includes in the Double patent the portions forming the 'upwardly and inwardly sloping tapering dovetail slipways 9 beneath said shoulders' in said patent, as well as the portion which extends across between said dovetail portions and to which the numeral 6 is applied in the drawing. This transversely extending portion of the downward extension is hollowed out or bored vertically to receive the lower portion of the spring-actuated rod and is slotted or provided with a key-way indicated at 7, in which travels the key, 17, for engaging the tilt slips. The entire

downward extension of the Double reamer as shown in this patent, constitutes a hollow slotted extension, not only for the reason that it includes the transverse portion just referred to, which is hollow and slotted as stated, but for the reason that it also includes the portions forming the slipways, 9, and is cut out or slotted between such portions forming the slipways, forming slots extending outwardly from or between the slipways so as to allow the tilt slips or portions thereof to project out through the sides of the said extension. In 'Defendant's Exhibit Wilson Patent' the downward extension comprises all that part which is in fixed relation with the body of the reamer and extends below the thrust-bearing, 10. In this reamer the downward extension takes the form of two prongs, 2, forming a fork connected near their lower ends by a detachable cross-piece, 11, in the form of a bolt secured by a nut, 12. The transverse portion connecting the slipway portions of this extension in the Double patent is omitted or removed in the Wilson patent except in so far as the cross-piece, 11, may be considered as forming a transverse portion. But this downward extension in the Wilson patent being hollowed out or provided with a transverse slot extending from side to side between the slipway portions, constitutes a hollow slotted extension. The prongs, 2, in the Wilson patent have shoulders, 2" on the inner faces to form ways, 3, for tilt slips, said ways, 3, having the same function in relation to the tilt slips as the slipways in the Double patent, and these shoulders corresponding to the dovetail flanges, 29, of the slipways, 9, in the Double patent. Between these shoulders, 2", in the Wilson patent there is an opening or slot extending vertically between the

slipway portions or prongs for permitting portions of the tilt slips to project out through the sides of the extension, these openings or slots corresponding in function to the openings or slots between the slipways, 9, in the Double patent. *The principle of action of the down-thrust bearings, 10, in the Wilson patent is the same as the principle of action of the shoulders, 8, in the Double patent,* serving in either case to furnish the downward pressure on the upper ends of the tilt slips or cutters in the working operation, so that the downward pressure due to the weight of the body and the parts connected to it is brought to bear on the tilt slips or cutters, forcing the latter to descend and to cut the rock by engagement therewith of their lower cutting edges. *The principle of action and the function of the downward extension is the same in 'Defendants' Exhibit Wilson Patent' as in 'Complainants' Double Patent.'* In either case the object of this downward extension is to extend along the side of the cutters or tilt slips so as to support the same from lateral displacement and to furnish the requisite bearings for holding the cutters in rigid relation when in working position, while at the same time providing, by the hollowing out or slotting of this extension, for the reception of the tilt slips or cutters and of the means for operating the same, comprising the adjacent portion of the spring-actuated rod and the key or cross-piece thereon.

The spreading-bearings in the Double patent are indicated at 25 at the lower end of the transversely extending portion of the downward extension of the body, and is referred to in the specification as the rounded face, 25, of the lower end of the downward extension, 6, of the mandrel.

The spreading-bearings in the Wilson patent are shown at 17, and are referred to in the specification as 'beveled end faces, 17, of the downwardly projecting lugs, 2'.' In both the Double and Wilson patent these spreading-bearings are inclined upwardly and outwardly from the center, so that when the shoulders on the tilt slips or cutters drag over these bearings the cutters will be tilted outwardly. The function and principle of action of these spreading-bearings with relation to the tilt slips or cutters are the same in the Wilson reamer, as shown in 'Defendant's Exhibit Wilson Patent,' and in the reamer shown in 'Complainants' Exhibit Double Patent 734,833.' In the Double patent these spreading-bearings are on the transversely extending portion which extends between the portions carrying the slipways; whereas, in the Wilson patent these spreading-bearings are on the portions which carry the slip ways. One consequence of this difference in construction is that the spreading-bearings of the Wilson underreamer, as shown in 'Defendant's Exhibit Wilson Patent,' are separated by an intervening open space in which there is no bearing action, forming a separate spreading-bearing on each side; whereas, in the Double underreamer, as shown in 'Complainants' Exhibit Double Patent,' the spreading-bearing is a single continuous surface. *The division or separation of the spreading-bearing in the Wilson reamer, however, does not change its principle of action, as the two separated parts are alike in form, and operate simultaneously on corresponding parts of the tilt slips, so that their action is concurrent and similar, and is equivalent in its mechanical spreading effect to a single spreading surface of equivalent bearing area.* Another consequence of this separation of

the spreading-bearings and the formation of the parts carrying the slipways instead of on the part extending transversely between the slipways, is that the spreading-bearings for the tilt slips are removed further from the axis of the tool in the Wilson reamer than is the case in the Double reamer. This outward displacement of the bearing surfaces, however, does not affect their function as spreading-bearings; *so that the principle of action and mode of operation of these spreading-bearings in the Wilson underreamer are the same as in the case of the underreamer shown in 'Complainants' Exhibit Double Patent,'* this function being to expand and tilt out the underreamers so as to cause their lower ends provided with cutting edges to project out considerably beyond the body of the tool into position to perform their function of cutting a hole larger than the body of the tool. In order to hold the tilt slips or cutters in this expanded position, after they have been expanded, the inside thrust-bearings are provided as shown at each side of the transverse portion of the downward extension of the body in the Double patent, and referred to in the specification as 'oppositely arranged parallel bearing faces,' these thrust-bearings being the lower portions of such faces adapted to co-act with the projections of bearing portions, 18, on the tilt slips. The lower inside thrust-bearings in the Wilson patent are shown at 9, and are referred to in the specification as spreading-bearings for holding the cutters 4, apart. These bearings, 9, are formed on lugs, 2', at the lower ends of the prongs, and are slightly inclined inwardly and in a downward direction, but are so nearly parallel to the vertical axis of the tool that any inward pressure brought on the cut-

ters is resisted by these bearings, and the cutters are thereby held out against the pressure or strain due to their impact on the rock; the function of these bearings being, in other words, as stated in the patent, to hold the cutters apart, which is the same function as performed by the flat parallel bearing faces on the transverse portion of the downward extension in the Double reamer. By reason of the omission of the transverse portion and the displacement of these thrust-bearing faces outwardly onto the portions carrying the slipways, these bearing faces in the Wilson reamer are further apart than they are in the Double reamer and are separated so as to form two faces on each side instead of a single face on each side; *but this change in construction or design in no way affects or changes their function as inside thrust-bearings. The principle of action of these bearing faces, 9, regarded as thrust-bearings is the same in the Wilson reamer as the principle of action of the flat parallel bearing faces in the Double patent, co-operating with the inward projections, 18, of the tilt slips.*

The upper inside bearings are indicated in the drawing of the Double patent as the upper portions of the parallel bearing faces on the transverse portion of the downward extension of the body, namely, that portion of the parallel bearing faces against which the inner upper portions of the tilt slips engage when in working position as shown in Figure 1. In the Wilson patent the inside upper bearing faces are the lower faces of the block, 7, which is in rigid relation with the body when the tool is assembled, these faces engaging the upper inside portions of the cutters so as to take the inthrust at such portions. When the parts are in

working position, shown in Figure 3, in the Wilson patent, and in Figure 1 of the Double patent, these inside bearings have the same principle of action and the same mode of operation in both the Wilson and Double reamers.

The tilt slips are indicated at 15 in the drawing of the Double patent, and are adapted to bear at their upper ends on their inside bearings aforesaid, and are provided with cutting edges at their lower outside portions and with inwardly projections or bearings, 18, which are adapted to ride on said parallel bearing faces, and with shoulders or faces, 26, above said bearings or projections, 18, which are adapted to slide on the spreading-bearings, 25, to cause the tilt slip to tilt so as to cause its lower end to move inwardly or outwardly while its upper end remains in contact with the upper inside bearing aforesaid; the principle of tilting being that one end (in this case the lower end) moves inwardly or outwardly while the other end (in this case the upper end) does not move inwardly or outwardly to any material extent. In the Wilson reamer, as shown in 'Defendant's Exhibit Wilson Patent,' the tilt slips indicated at 4, and referred to in the specification as cutters, are provided with bearing faces, 4³, bearing on the lower inside thrust-bearings, 9, in working position, shown in Figure 3; and with 'rounded corners or bearings, 16'', at the upper end of these bearing faces, 4³, to ride over the beveled end faces, 17, which constitute the spreading-bearings in this reamer, so as to cause expansion or permit collapse of the tilt slips. In 'Defendant's Exhibit Wilson Patent' the cutters engage at their upper ends with the inside thrust-bearings constituted by the lower portions of block 7 in working posi-

tion; but as the cutters or tilt slips move downwardly relative to the body, for example, in withdrawing the tool through the casing, as shown in Figure 1, these cutters or tilt slips find a bearing on the outer ends of the cross-piece, 5, of the spring-actuated rod, which holds these upper ends from moving inwardly under the inward pressure of the shoe and causes a collapsing action to take place by tilting the lower ends of the cutters inward, this being a tilting action since the lower ends move in and out in operation, while the upper ends do not move in and out to any material extent.

The tilt slips in both the Double underreamer, 'Complainants' Exhibit Double Patent,' and the Wilson underreamer, have recesses on their inner faces for receiving and engaging the key or cross-piece for hanging the tilt slips or cutters on the spring-actuated rod. In the Double patent these are referred to as sockets or key-seats, 16, and in the Wilson patent they are referred to as recesses, 18, in the inner faces of the cutters. In each case these recesses or sockets are shown as sufficiently larger than the key or cross-piece to enable tilting of the tilt slips or cutters. *The principle of action and mode of operation of these tilt slips or cutters are the same in 'Complainants' Exhibit Wilson Reamer,' and in 'Defendant's Exhibit Wilson Patent,' and in the underreamer disclosed in 'Complainants' Exhibit Double Patent 734,833.'* In the Double patent the bearings on these tilt slips for engaging with the spreading-bearings and with the lower inside thrust-bearings, are located directly on the inner faces of the tilt slips and extend across from side to side. In 'Complainants' Exhibit Wilson Reamer' and in 'Defendant's Ex-

hibit Wilson Patent,' the corresponding bearings on the tilt slips for engaging with the spreading-bearings and with the lower inside thrust-bearings of the extension of the body, are located at each side of the center: this difference in construction or design following necessarily from the division of the said bearing faces on the extension of the body into separate parts at the respective sides, and in no way changing or affecting the principle of action or mode of operation of these bearings either in the spreading action or in holding the tilt slips or cutters apart after they had been spread

The actuating means for lifting the tilt slips in the slipways consist, in the reamer shown in 'Complainants' Exhibit Double Patent,' of the rod, 14, spring, 10, acting on said rod and resting on a shoulder, 5, in the body, and a key, 17, carried by said rod and extending into the sockets in the tilt slips so as to draw the same upwardly. The means for lifting the tilt slips in 'Defendant's Exhibit Wilson Patent' consists in the rod or stem, 5', the spring, 6, acting on said rod or stem and resting on a bearing constituted by the block, 7, and a cross-piece or cross, 5, on the said rod extending into the recesses, 18, in the cutters or tilt slips so as to tend to lift the same. In each case the tilt slips are tiltingly hung or suspended on the spring-actuated rod by means of the cross-piece or key, as the case may be, and are drawn upwardly by the spring acting on said rod so as to tend to raise the tilt slips into working position and cause their bearing portions on said tilt slips to ride over the spreading-bearings on the extension of the body so as to tilt the tilt slips and spread apart their lower ends while their upper ends are suspended

on said spring-actuated rod. *The principle of action of the means for lifting the tilt slips is the same in the Wilson reamer and in 'Defendant's Exhibit Wilson Patent' as it is in the reamer disclosed in 'Complainants' Exhibit Double Patent,'* consisting in hanging or suspending the tilt slips near their upper ends in such manner as to permit their lower ends to tilt or swing in and out and to exert a continual upward pressure on the tilt slips, tending to move them toward and hold them in working position.

Q. 37. What portion, if any, of the Wilson underreamers, either as exemplified in 'Complainants' Exhibit Wilson Underreamer,' or 'Complainants' Exhibit Wilson Underreamer No. 2,' or in the Wilson patent, corresponds in function and effect to the parts in the Double reamer related to the upward and inward inclination of these dovetails

A. The downward and inward inclination of the bearings, 9, shown in the Wilson patent corresponds in function to the upward and inward inclination of the dovetails in the Double patent, the downwardly and inwardly inclined bearings, 9, in the Wilson patent being related to the vertically extending or parallel faced dovetails, or shoulders, 2", in the Wilson patent in the same manner that the parallel faces on the lower portions of the transverse portion of the downward extension, 6, in the Double patent is related to the upwardly and inwardly inclined dovetails in the slipways, 9, of the Double patent; the fact that the inclination is on the upper out bearing and the straight or parallel face is on the lower inner bearing in the Double patent, while the inclination is on the lower inner bearing and the straight or parallel face is on the

upper outer bearing in the Wilson patent, amounting to the same thing in its mechanical effect.

Q. 38. In your answer to question 14 in referring to the Double underreamer as exemplified in Complainants' Exhibit Double Patent, the patent in suit, you say in referring to these upwardly and inwardly inclined dovetails: 'These dovetails, therefore, do not come into action in the normal and expanding and collapsing operation except when the tilt slips are fully expanded in the position shown in Figure 1.' In this respect how do the dovetails of the Wilson underreamer compare?

A. The same thing is true with respect to the dovetails in the Wilson patent and Wilson underreamer, inasmuch as the dovetails of the cutters and on the slipways separate as soon as the cutters begin to move downwardly, this separation being due to the bearing faces, 4³, on the cutters riding downwardly and slightly inwardly on the bearing faces, 9, in the Wilson reamer, thereby causing the shoulders, 4², on the cutters riding downwardly and slightly inwardly on the bearing faces, 9, in the Wilson reamer, thereby causing the shoulders, 4², on the cutters to incline downwardly and inwardly away from the shoulders, 2'', on the slipways, so that if these shoulders contact at all it would only be at their upper ends. In the case of the Wilson, as well as in the case of the Double underreamer, when the underreamer is being drawn up within the shoe, the pressure of the shoe is inward on the tilt slips or cutters, so as to hold them toward the inside bearing faces and away from the outside bearing faces; as the pressure is wholly inward, and the outside bearings furnished by the dovetails can only resist outward pressure, they cannot have, in either case, any effect in this

inward tilting and downward sliding movement of the cutters or tilt slips as they pass upwardly within the shoe." [Record pp. 737-738.]

"Q. 46. If I understand your testimony correctly, the internal shoulder, 8, on the hollow mandrel or body of the underreamer of 'Complainants' Exhibit Double Patent,' takes the upthrust of the bits in underreaming?

A. Yes, sir.

Q. 47. What takes a similar thrust in 'Complainants' Exhibit Wilson Underreamer' or 'Complainants' Exhibit Wilson Underreamer No. 2'?

A. The internal shoulder on the hollow body which is numbered 10 in the 'Defendant's Exhibit Wilson Patent.'

Q. 48. In the Double underreamer you have referred to a downward extension having opposite parallel bearing faces having a keyway therein. Is there anything in the Wilson underreamer corresponding to this; if so, point it out?

A. Referring to the Wilson patent for identification of the parts, the downward extension consists of the prongs, 2, with the cross-piece, 11, connecting the same, and the parallel bearing faces with this downward extension are represented in this patent by the bearings, 9, which are so slightly inclined that they perform the function of parallel bearing faces. And the key-way in the downward extension of the Wilson patent is represented by the open space or a portion of the open space between the prongs, 2, within which space the cross-head, 5, on the spring-actuated rod travels vertically, this being the function of the key-way in the Double patent." [Record pp. 742-743.]

This comparison of the elements of the defendant's reamers with the Double invention shows conclusively that each and every of the elements of the defendant's reamers have substantially the same relation to each other and perform substantially the same functions in the reamer and in substantially the same manner as the comparative elements of the Double invention.

No rule of patent law is better settled than that two devices are the same if their principles or modes of operation are the same, and the elements used are substitutes for each other, performing substantially the same functions in substantially the same manner.

As said by this court in *Norton v. Jensen*, 49 Fed. 859, 866:

"It is well settled that a copy of the principle or mode of operation described in the prior patent is an infringement of it. If the patentee's ideas are found in the construction and arrangement of the subsequent device, no matter what may be its form, shape, or appearance, the parties making or using it are deemed appropriators of the patented invention, and are infringers. An infringement takes place whenever a party avails himself of the invention of the patentee without such a variation as constitutes a new discovery."

And Judge Nelson in *Blanchard v. Beers* (2 Blatch. 416), says:

"The sure test, and one the jury should be guided by in all cases of this kind, is whether or not the defendant's machine, whatever may be its form or mechanical construction, has incorporated within it the principle, or the combination, or the

novel ideas which constitute the improvement to be found in the plaintiff's machine."

And the same learned judge in *Tatham v. LeRoy* (2 Blatchf. 486), said:

"Formal changes are nothing—*mere mechanical changes* are nothing; all these may be made outside of the description to be found in the patent, and yet the machine, after it has been just changed in its construction, is still the machine of the patentee, because it contains his invention, the fruits of his mind, and embodies the discovery which he has brought into existence and put into practical operation."

And the Circuit Court of Appeals for the Eighth Circuit in *Lourie Implement Company v. Lenhart* (130 Fed. 122), says:

"One may not escape infringement by adding or subtracting from a patented device by changing its form or by making it more or less efficient, while he retains its principle and mode of operation, and attains its result by the use of the same or equivalent means."

As said by the court in *Eck v. Kutz* (¹³²~~352~~ Fed. 758):

"The question is whether the inventive idea expressed in the patent has been appropriated; and if it has, infringement has been made out.

"But with all this the operation is essentially unchanged, not only the whole, but of each part, and this is the significant thing."

See page 766

See also:

Powell v. Leicester Mills Co., 108 Fed. 386, 47
C. C. A. 416;

Morrison v. Sonn, 111 Fed. 172;

Letson v. Alaska Packers' Ass'n, 130 Fed. 129;

American Can Co. v. Hickmot Co., 142 Fed. 141,
146;

Columbia Wire Company v. Kokomo Co., 143
Fed. 116;

Comptograph Co. v. Mechanical Acc't Co., 145
Fed. 331, 337;

Corrington v. Westinghouse Co., 173 Fed.
69, 81.

As said by the Circuit Court of Appeals for the
Sixth Circuit, in Vrooman v. Penhollow, 179 Fed. 296:

“Whether an invention be a pioneer, or, being
of small importance, is ranked at the foot of the
line, the rule is that it shall be judged on its own
merits; that is to say, according to the advance
it has made in novelty and utility beyond the
prior art.”

McSherry Mfg. Co. v. Dowagiac Co., 101 Fed.
716;

Penfield v. Chambers Bros. Co., 92 Fed. 639;

Paper Bag Co. case, 210 U. S. 405.

Before referring to the claims of the Double
patent in suit it is fitting that consideration should be
given to the rules of interpretation as established
by the decision of the courts. The following will serve
as examples:

"The court should proceed in a liberal spirit so as to sustain the patent and the construction claimed by the patentee himself if it can be done consistently with the language which he has employed."

Klein v. Russell, 19 Wall. 433.

"Patents should be construed in a liberal spirit to sustain the just claims of the inventor. This principle is not to be carried so far as to exclude what is in it, or to interpolate anything which it does not contain. But liberality, rather than strictness, should prevail, where the fate of the patent is involved, and the question to be ~~determined~~^{decided} is whether ~~or not~~ the inventor shall hold or lose the fruits of his genius and ^{his} labors."

Rubber Co. v. Goodyear, 9 Wall. 795.

"The claims of a patent are to be fairly construed so as to cover, if possible, the invention, and thus save it, if it be a meritorious one. In approaching a patent, we are to look primarily at the thing the inventor conceived and described in his patent."

Mossberg v. Metter, 135 Fed. 99.

In Columbia Wire Company v. Kokomo Company, 143 Fed. 116, 124, the Circuit Court of Appeals for the Seventh Circuit says:

"The object of the law authorizing the grant is to stimulate invention by this reward to the inventor. It must be administered in conformity with this liberal policy, as a wise exception from the common law against monopolies. *So the exclusive privilege of the patentee must be protected to the full extent of his invention and grant.*"

In *Ferry-Hallock Co. v. Hallock*, 142 Fed. 172, 176
the court says:

"Where the whole substance of the invention may be copied in a different form, it is the duty of the courts and juries to look through the form for the substance of the invention--for that which entitled the inventor to a patent, and which the patent was designed to secure. Where that is found there is infringement. *Winans v. Denmead*, 15 How. 338, 14 L. Ed. 717; *Machine Co. V. Murphy*, 97 U.S. 120, 24 L. Ed. 935."

In *Curry Co.*, 171 Fed. 416, it is said:

"Infringement is shown where the alleged infringing device operates on the same principle as that of the patent, and accomplishes the same result in substantially the same way by equivalent means; the only difference being in the form or proportions of the parts."

Syllabus
Cf. top of
page 422
of 171 Fe

In *Weber Electric Co. v. Union Electric Co.*, 226 Fed. 482, the court holds:

"Merely changing the form or location of the mechanical elements of a patented structure does not avoid infringement, if such alterations are but different ways of mechanically expressing the dominant feature of the inventive idea and achieve the same result in substantially the same way."

Infringement was charged of claims 1, 2, 6, 7 and 8 of the Double patent in suit. Each of these claims is a combination claim. An understanding of the principle of "combination" claims is necessary to a proper interpretation thereof. It must be remembered and it must be borne in mind that the statement of elements in a combination claim is in reality nothing more than a

“The court should proceed in a liberal spirit so
tent and the construction

which it does not contain. But liberality, rather than strictness, should prevail, where the fate of the patent is involved, and the question to be ~~determined~~^{decided} is whether ~~or not~~ the inventor shall hold or lose the fruits of his genius and ^{his} labors.”

Rubber Co. v. Goodyear, 9 Wall. 795.

“The claims of a patent are to be fairly construed so as to cover, if possible, the invention, and thus save it, if it be a meritorious one. In approaching a patent, we are to look primarily at the thing the inventor conceived and described in his patent.”

Mossberg v. Metter, 135 Fed. 99.

In Columbia Wire Company v. Kokomo Company, 143 Fed. 116, 124, the Circuit Court of Appeals for the Seventh Circuit says:

“The object of the law authorizing the grant is to stimulate invention by this reward to the inventor. It must be administered in conformity with this liberal policy, as a wise exception from the common law against monopolies. *So the exclusive privilege of the patentee must be protected to the full extent of his invention and grant.*”

In *Ferry-Hallock Co. v. Hallock*, 142 Fed. 172, 176 the court says:

“Where the whole substance of an invention—that which entitled the inventor to a patent—may be copied in a different form, it is the duty of the court to look through the form of an alleged infringing device for the substance which the patent was designed to secure, and where that is found there is infringement.”

In *Seeger Refrigerator Co. v. American Car & Foundry Co.*, 171 Fed. 416, it is said:

“Infringement is shown where the alleged infringing device operates on the same principle as that of the patent, and accomplishes the same result in substantially the same way by equivalent means; the only difference being in the form or proportions of the parts.”

Sylla
Cf. to
page
of 17

In *Weber Electric Co. v. Union Electric Co.*, 226 Fed. 482, the court holds:

“Merely changing the form or location of the mechanical elements of a patented structure does not avoid infringement, if such alterations are but different ways of mechanically expressing the dominant feature of the inventive idea and achieve the same result in substantially the same way.”

Infringement was charged of claims 1, 2, 6, 7 and 8 of the Double patent in suit. Each of these claims is a combination claim. An understanding of the principle of “combination” claims is necessary to a proper interpretation thereof. It must be remembered and it must be borne in mind that the statement of elements in a combination claim is in reality nothing more than a

catalogue of the elements specified as composing entity,
—the combination.

It is well settled law that to substitute for one of these elements its mechanical equivalent is not to change the combination or to destroy the entity expressed by the combination.

As said by the Circuit Court of Appeals for the 6th circuit in *Yesbera v. Hardesty Co.*, 166 Fed. 120, 125:

“The point to be emphasized is that the law looks not at the elements or factors of an invented combination as a subject for a patent, but only as to the combination itself as a unity distinct from its parts.”

As said by the Circuit Court in *Leeds & Catlin Co. v. Victor Talking Mach. Co.*, 213 U. S. ^{325, 332}~~301, 310~~:

“A combination is a composition of elements, some of which may be old and others new, or all old or all new. It is, however, *the combination* that is the invention, and is as much a unit in contemplation of law as a single or non-composite instrument. Whoever uses it without permission is an infringer of it. Whoever contributes to such use is an infringer of it.”

See also 213 U.S. 318.

In *Crown Cork & Seal Co. v. Standard Brewery*, 174 Fed. 262, the court says:

“All the claims are for a combination. ‘A combination is a union of elements which may be partly old and partly new, or wholly old or wholly new. But, whether new or old, the combination is a means,—an invention,—distinct from them. They, if new, may be inventions, and the proper subjects of patents, or they may be covered by

claims in the same patent with the combinations.
* * * They are not identical with the combination. * * * *Certainly one element is not the combination*, nor in any proper sense, can it be regarded as a substantive part of the invention represented by the combination, and it can make no difference whether the element was always free or becomes free by the expiration of a prior patent, foreign or domestic. In making a combination, an inventor has the whole field of mechanics to draw from."

Claim 1.

The first claim of the Double patent calls for *the combination* of the following elements:

"An underreamer comprising a hollow mandrel furnished with an internal shoulder."

The "mandrel" referred to is the hollow body 1 and the internal shoulder referred to is the shoulder 5, which forms the seat for the spring 10.

In the Wilson reamer the body is numbered 1 and the seat for the spring 6 is not formed as *an integral part* of the body, but is formed by the removable block 7, using the reference numerals of the Wilson patent. (Book of Exhibits, pp. 84-87.)

In the Wilson Improved reamer the block 7 is not used, but the removable shoulder, or seat for the spring, is formed by a key which extends through a slot in the spring-actuated rod or mandrel and seats on the bottom of a slot in the body 1. The function of this seat formed either by the removable block 7 or by the key

is identically the same as that of the seat or shoulder, 5, of the Double patent.

“A downward extension having opposite parallel bearing faces having a key-way therein.”

This downward extension in the Double reamer is all that portion of the body 1 which is extended below the shoulders 8 and it is provided with a slot or key-way, 7, longitudinally extended for the vertical play of the bit or cutter supporting key 17.

In the Wilson patent the “downward extension” is all that portion of the body which extends below the shoulders, 10, and has the open slot in which the key or tee head reciprocates up and down.

The term “key-way” means that the material is cut out sufficient for the key or tee-head to move up and down in the extension.

“Shoulders at the sides of such extension.”

These are the shoulders 8 of the Double patent at the upper end or at the commencement of the downward extension. They find their counterpart in the shoulders 10 of the Wilson patent, which shoulders 10 of the Wilson patent are provided to receive the upthrust from the ends of the cutters or bits in the same manner as the shoulders 8 of the Double invention receive the upthrust from the ends of the cutters or bits.

“Upwardly and inwardly sloping dovetail slipways beneath said shoulders.”

These are formed by slotting the sides of the downward extension 6, and are provided to permit the

shanks of the bits to extend beyond the surface of the body so that the shoe of the casing may contact therewith, as explained by Mr. Knight in his testimony, to cause the downward movement of the bits against the tension of the spring, in collapsing the bits or cutters to withdraw the reamer from the well hole up through the well casing.

The Wilson reamer is provided with such open slipways and such slipways are beneath the shoulders, 10, of the Wilson patent. It is true that these slipways are not provided with dovetails which are "upwardly and inwardly sloping." As Mr. Knight has pointed out, the dovetails of the slipways of the Wilson reamer have been made straight and the bearing surfaces 9 of the Wilson reamer have been inclined. Mr. Knight has pointed out the correspondence in function and relation between the upwardly and inwardly sloping dovetail slipways and the straight parallel bearing faces of the Double extension and the straight dovetail slipways and inclined bearing faces 9 of the Wilson extension. Mr. Knight has pointed out that this change has made no change in the mode of operation and that the two are mechanical equivalents and substitutes.

See
~~As said~~ in Columbia Wire Co. v. Kokomo Steel & Wire Co., 143 Fed. 116; *which according to the "Cards Dig applies the principle that:*

"Infringement of a combination claim is not escaped by transposition and rearrangement of some of the elements where there is no substantial difference in principle or result of the combined means and operation. A patentee is entitled to protection against evasions of the wording of a claim."

*See particularly last paragraph
page 121 and page 122 of 143 Fed. Rep.*

As said in *Wagner Typewriter Co. v. Wyckoff, Seamans & Benedict*, 151 Fed. 585-593:

“Infringement is not avoided by changes in a patented machine which are non-essential, as by changing the position of parts or transferring a function from one part to another, without affecting the principle or mode of operation.”

“A spring on the shoulder in the hollow mandrel.”

This is the spring 10 of the Double patent and the spring 6 of the Wilson patent. Both operate for the same purpose and in identically the same manner.

“A rod playing in the mandrel furnished with a key-seat and supported by the spring.”

This is the rod 11 of the Double patent and the rod or tee 5' of the Wilson patent and the key-seat and key in the Double patent are the mechanical equivalents of the solid head or key in the Wilson device.

“Dovetail tilt slips playing in the slip-ways and furnished with key-seats respectively.”

These are the slips or cutters or bits 15 of the Double patent and the bits 4 of the Wilson patent. These slips or bits in both the Double and Wilson are provided with key-seats. In the Double patent they are shown at 16 and are described in lines 75 *et seq.*, page 4, of the book of exhibits, Double patent in suit. The key-seats are shown at 18, Fig. 9, page 85, book of exhibits, Wilson patent. By referring to Fig. 1, page 84, it will be seen that identically the same tilting action takes place with the Wilson slips or cutters as in the Double. Compare this Fig. 1 of the drawings

of the Wilson patent with Fig 3 of the Double patent in suit. It is seen that the tilting action is identical in this respect. It will be seen that the sockets or key-seats 18 of the Wilson reamer are somewhat larger than the head or key 5 to permit the bits or slips 4 to have this tilting action in the same sense as described in the Double patent specification.

“A key in the key-seats of the slips and rod and playing in the key-way of said extension to hold the slips against the shoulders.”

The key designated is the key 17 of the Double patent. It extends into each of the key-seats 16 of the Double bits or slips. It is carried by the spring-actuated rod 11. The solid tee or key-head of the Wilson rod 5' is the full equivalent and plays in the slot or key-way in the extension of the body of the reamer in the same manner and for the same purpose as does this corresponding element in the Double invention. It performs identically the same function in supporting and actuating the slips or cutters.

“Said slips being furnished with inward projections to slide upon the downward extension of the mandrel to spread apart the cutting edges of the slips when the slips are drawn up.”

The “inward projections” referred to are the projections 18 forming the intrust bearings of the Double cutters. It is to be noted that these *face or project inwardly toward* the center of the body of the reamer when the slips or cutters are in place and ride upon or bear upon the intrust bearings of the extension.

The surfaces 4³ of the Wilson slips or cutters also face or project inward in this same relation and for the same purposes; they have the same function and effect and are the full mechanical equivalents. The change of their location has not changed their function nor substantially changed their mode of operation.

The fact that Mr. Wilson has divided the intrust bearings 9 on the extension of the body and the intrust bearing 16 on the cutters into two parts and transposed these to the outer edges or sides of these elements does not avoid infringement. This is well settled upon the best authority.

In *Standard Co. v. Fastener Co.*, 113 Fed. 162,¹⁶⁹ the Court of Appeals says:

“Infringement cannot^{ordinarily} be escaped by merely cutting in two a device made in one piece, or by making integral an article formerly made in two.”

In the case of *Conley v. King Bridge Co.*, 187 Fed. 137, the court ~~says~~ *held that*:

“The placing of stops at the top of the track of a guide for punching presses instead of at the side, and the arrangement of a reciprocating rod to work vertically instead of laterally, does not avoid infringement.”

See page 140 of 187 Fed. Rep.

In that case there was a bigger transposition of the location of parts than there is in the present case where the bearings 9 and the tilting shoulders 4³ and 16 of the Wilson patent have been slightly transposed from their positions in the device as shown in the Double patent in suit.

In *Louden Machinery Co. v. Strickler*, 195 Fed. 751, 756, the Circuit Court of Appeals for the Seventh Circuit says:

“Whether the ‘annular lip’ be supported in its functioning position by a dog having a solid body or a skeleton frame is immaterial to the actual invention disclosed and claimed. Form is material only so far as it is essential to the operation, or indispensable, by reason of the state of the art, to the novelty of the claim.”

In other words, in order to show that the parallel bearing faces of the Double patent are necessary in the particular form as parallel faces, and that the claims are limited to the precise form of parallel faces, it is necessary to show that in the interrelation of the combination of elements of the claim those faces had been made in some other form and had been used to perform the same function in the same combination.

In *Ide v. Trorlicht, Duncker & Renard Carpet Co. et al.*, 115 F. 137, the Court of Appeals (8th Cir.), says:

“Mere changes in the form of a device, or of some of the mechanical elements of a combination, will not avoid infringement, where the principle or mode of operation of the invention is adopted, except in those rare cases in which the form of the improvement or of the element changed is the distinguishing characteristic of the invention.”

The Circuit Court of Appeals for the Sixth Circuit, in *Dowagiac Co. v. Superior Drill Co.*, 115 Fed. 886, says:

“One does not escape liability for infringement by changing the form or dimensions of the parts

of a patented combination, where such change does not break up or essentially vary the principle or mode of operation pervading the original invention."

The "Card's Digest" quotes:

The Circuit Court of Appeals of the Seventh Circuit, in *Adam v. Folger*, 120 Fed. 260, says:

"Variation of form, location or sequence of the elements of a combination from that defined in the claim of a patent where such location is not essential to the result the patentee desired, nor made indispensable to novelty by the state of the art, does not avoid infringement as would omission of an element from a combination."

See particularly page 263 of 120 Fed. Rep.

And in *Benbow-Brammer Mfg. Co. v. Simpson Mfg. Co.*, 132 Fed. 614, the court says:

"A specific description of an element in a claim does not operate as a limitation to the form shown unless it is of the essence of the invention, and evasion of the specified form will not escape infringement when the substance of the invention is copied, as a court does not judge about similarities or differences by the names of things, but looks to the machines, or the several devices or elements, in the light of the function they perform."

We thus find that we have for consideration a thing or entity,—a combination,—which is for a given purpose and consists of certain parts or elements having specified relations to each other to perform certain functions. This organization must be considered "in the law of what they (the elements or parts) do or what office or function they perform." (*Bates v. Coe*, 98 U. S. 31.)

Having discussed these elements of claim 1 of the patent in suit separately, perhaps it will further illustrate and emphasize the absolute correspondence of the Wilson reamer to the elements as well as to the combination of this claim to again analyze the claim and opposite each of the elements of the claim set forth the corresponding part or element of the Wilson reamer. This may properly and correctly be accomplished as follows:

Claim 1.

DOUBLE PATENT.

WILSON REAMER.

A hollow mandrel or body 1, furnished with an internal shoulder 7	The hollow mandrel or body 1 furnished by means of a shoulder 7
---	---

5, the rod 5 may work up
and down in this extension.)

Shoulders 8 at the sides
of such extension.

Shoulders 10' at the
sides of such extension.

of a patented combination, where such change does not break up or essentially vary the principle or mode of operation pervading the original invention."

The "Cards Digest" quotes:

The Circuit Court of Appeals of the Seventh Circuit, in *Adam v. Folger*, 120 Fed. 260, says:

"Variation of form, location or sequence of the elements of a combination from that defined in the claim of a patent where such location is not essential to the result the patentee desired, nor made indispensable to novelty by the state of the art, does not avoid infringement as would omission of an element from a combination."

See particularly page 263 of 120 Fed. Rep.

And in *Benbow-Brammer Mfg. Co. v. Simpson Mfg.*

"All concur in the view that specific description in the claim of an element does not operate as a limitation to the form thus shown, unless it is of the essence of the invention, and evasion of the specified form will not escape infringement where the substance of the invention is copied; that courts 'are not to judge about similarities or differences by the names of things, but are to look at the machines, or the several devices or elements, in the light of what they do, or what office or function they perform, and how they perform it. (*Machine Co. v. Murphy*, 97 U. S. 120, 24 L. Ed. 935), and thus ascertain whether the substance of patentable novelty is infringed.

specified relations to each other to perform certain functions. This organization must be considered "in the law of what they (the elements or parts) do or what office or function they perform." (*Bates v. Coe*, 98 U. S. 31.)

Having discussed these elements of claim 1 of the patent in suit separately, perhaps it will further illustrate and emphasize the absolute correspondence of the Wilson reamer to the elements as well as to the combination of this claim to again analyze the claim and opposite each of the elements of the claim set forth the corresponding part or element of the Wilson reamer. This may properly and correctly be accomplished as follows:

Claim 1.

DOUBLE PATENT.

A hollow mandrel or body 1, furnished with an internal shoulder 5.

A downward extension having opposite parallel bearing faces having a keyway therein. (This is all that portion of the underreamer body below the shoulders 8 as pointed out in the oral argument.)

Shoulders 8 at the sides of such extension.

WILSON REAMER.

The hollow mandrel or body 1 furnished by means of the "block or spring-seat 7 with a removable internal shoulder.

A downward extension having opposite inclined bearing faces 9. (This is all that portion of the body below the shoulders 10', the keyway exists by virtue of the open hollow slotted construction so that the head or key 5 carried by the rod 5' may work up and down in this extension.)

Shoulders 10' at the sides of such extension.

Upwardly and inwardly Straight dovetails 3 be-
sloping dovetails slipways neath said shoulders 10'.
beneath said shoulders 8.

(It is to be noted that so far claim 1 has only refer-
ence to formation of the body itself,—the next portion
of the claim bringing into the combination the asso-
ciated parts.)

A spring 10 on the
shoulder 5 in the hollow
mandrel 1.

A rod 11 playing in the
mandrel 1 furnished with
a keyseat and supported by
the spring 10.

Dovetails tilt-slips 15
playing in the slipways 9
and furnished with key-
seats (16) respectively.

A key 17 in the keyseats
of the slips and rod and
playing in the keyways of
said extension to hold the
slips against the shoulders
8.

Said slips 15 being fur-
nished with inward projec-
tions 18 to slide upon the
downward extension of
the mandrel to spread
apart the cutting edges of
the slips when the slips
are drawn up.

A spring 6 on the shoul-
der 7 in the hollow man-
drel 1.

A rod 5' playing in the
mandrel 1 and furnished
with a head and supported
by the spring 6.

Dovetail tilt-slips 4
playing in the slipways 3
and furnished with key-
seats (18) respectively.

A head 5 in the keyseats
18 of the slips, a part of
the rod 5' and playing in
the keyway of said exten-
sion to hold the slips
against the shoulder 10'.

Said slips 4 being fur-
nished with inward pro-
jections 4³ to spread apart
the cutting edges of the
slips when the slips are
drawn up.

From this analysis of the combination of claim 1 it is thus ascertained that the Wilson reamer corresponds exactly to the combination and only differs from the exact details thereof in

1. Making the internal shoulder removable, without changing its function or its interrelation as a seat or supporting shoulder.

2. The consolidation of the key 17 and rod of the Double into one integral part without changing its function or interrelation as a means for supporting and moving the cutters.

3. The changing of the intrust bearings from *parallel* bearing faces to *inclined* and co-incidentally changing the dovetails to *straight* or *parallel* instead of *inclined*, without changing their interrelations, mode of operation or co-operative principles.

Applying the rule of *Bates v. Coe*, the combination thus expressed in claim 1 is fully found in defendant's Wilson reamer. Making two parts or elements in one or dividing one into two does not avoid infringement.

Kings County Co. v. U. S. Cons. Seeded R. Co.,
182 Fed. 59 (C. C. A., 9th Cir.);

Standard Caster Co. v. Caster Co., 113 Fed.
162 (C. C. A., 6th Cir.);

H. F. Braummer Co. v. Witte Co., 159 Fed.
726;

Bundy Co. v. Detroit Co., 94 Fed. 524, 538;

Mabie v. Haskell, Fed. Cas. No. 8, 653;

White v. Walbridge, 46 Fed. 526;

Weber v. Accessories Co., 190 Fed. 189;

Pederson v. Dundon, 220 Fed. 309;

Stockland v. Russell Co., 222 Fed. 906;

Yancey v. Enright, 230 Fed. 641 (C. C. A., 5th
Cir.).

To hold that *the combination* of claim 1 is found in the Wilson reamer does not, therefore, require a broad or sweeping application of the doctrine of mechanical equivalency,—in fact, not even a *liberal* application thereof. However, if a liberal application were required, the novelty and importance of the Double invention,—the place which Double's invention has had in the commercial development of this most needed tool,—does entitle the Double invention and patent to a liberal application of this doctrine of equivalents.

As said by this court in

Fullerton Walnut Growers Assn. v. Anderson-Barngrover Manufacturing Co., 166 Fed. 443, 451:

“Patents should be construed in a liberal spirit, to sustain the just claims of the inventor.”

In this connection it should be noted that in reality the only application of the doctrine of equivalency to any of the elements of claim 1 at all required is as to the making in one piece of the key and spring-actuated rod and the changing of the parallel intrust or bearing-faces to inclined intrust of bearing-faces in connection with the change of the dovetails of the slipways and cutter-shanks to straight dovetails, *without in any manner changing their co-operative relation or their functions*. This is a mere change of form and does not avoid infringement.

Adams Co. v. Schreiber & Conchar Co., 111 Fed. 182;

Brill v. North Jersey Co., 124 Fed. 778;

Dowaigiac Mfg. Co. v. Minnesota Co., 118 Fed. 136;

Ide v. Trorlicht Co., 115 Fed. 137.

Claim 2.

DOUBLE.

A mandrel or body 1 having a downward extension provided with *parallel* bearing-faces and a keyway in the extension.

A spring-supported rod 11 and furnished with a key-seat and playing up and down in the mandrel 1.

Tilt-slips 15 slidingly connected with the mandrel and furnished with inward projections 18 to slide upon opposite bearing-faces of the downward extension to spread the bits apart at the lower ends when the slips are drawn up.

And a key carried by the rod and carrying the slips.

WILSON.

A mandrel or body 1 having a downward extension provided with *inclined* bearing-faces and a slot or keyway in the extension.

A spring-supported rod 5' furnished with a head and playing up and down in the mandrel 1.

Tilt-slips 4 slidingly connected with the mandrel and furnished with inward projections 4^s to slide upon opposite bearing-faces 9 of the downward extension to spread the bits apart at the lower ends when the slips are drawn up.

And a head or integral key formed on and carried by the rod and carrying the slips.

Again we find that the sole distinction between the combinations *as described* by claim 2 of the Double patent and as embodied in defendant's reamer to be

1. The change from *parallel* intrust bearing-faces to slightly *inclined* bearing-faces, substan-

tially identical in form, interrelation with the other elements and performing identically the same function in the same manner,—perfect mechanical equivalent in this combination.

2. The making of the key and rod in one piece without change so far as function or mode of operation is concerned in this combination. True equivalents. Claim 2 is therefore clearly infringed.

This court has plainly expressed itself as condemning the frequent attempts of infringers to limit claims of patents to the precise form and specific construction recited, regardless of whether such specific form or specific construction is necessary or requisite to the working of the device or was the sole novelty of the invention. In *Kings Co. Co. v. U. S. Con. S. R. Co.*, 182 Fed. 59, 63, this court says:

“It does not ^{necessarily} follow, from the fact that the claim describes a specific form of construction, that the inventor shall be limited to that form. All depends on his expressed intention and the scope of the actual invention which he has made. If his improvement is but a narrow one, or if he has used language such as clearly to show his intention to limit his invention to a particular form described, then he is held to the language of his claim, and limited to that specific form. But if his is a pioneer invention, or one of such merit as to be entitled to a liberal construction, the claim will not be thus limited, *even if couched in specific language*, unless the inventor has also shown his positive intention to relinquish to the public all other forms in which his invention might be embodied.”

See also:

Winans v. Denmead, 15 How. 330;

Western Elec. Co. v. LaRue, 139 U. S. 601;

Hoyt v. Horns, 145 U. S. 302;

Sessions v. Romadka, 145 U. S. 29.

In *J. L. Owens Co. v. Twin City Separator Co.*, 168 Fed. 259, 267, the Circuit Court of Appeals for the Eighth Circuit says:

“Mere changes of the form or composition of a device or of some of the mechanical elements of a combination will not avoid infringement, where the principle or mode of operation of the patented improvement or combination is adopted, unless the form or composition is the distinguishing characteristic of the invention.

Columbus Watch Co. v. Robbins, 64 Fed. 384, 396, 12 C. C. A. 174, 187;

New Departure Bell Co. v. Bevin Bros. Mfg. Co. (C. C.), 64 Fed. 859;

Machine Co. v. Murphy, 97 U. S. 125, 24 L. Ed. 935;

Winans v. Denmead, 15 How. 342, 14 L. Ed. 717;

Robinson on Patents, Sec. 141, p. 201;

Blandy v. Griffith, 3 Fed. Cas., p. 678, No. 1, 529;

Bonnette Arc Lawn Sprinkler Co. v. Koehler, 82 Fed. 431, 27 C. C. A. 200;

National Hollow Brake-Beam Co. v. Interchangeable Brake-Beam Co., 45 C. C. A. 544, 562, 106 Fed. 693, 711.

‘If two devices do the same work in substantially the same way and accomplish substantially the same result, they are the same, even though they differ in name, form, or shape.’

Machine Co. v. Murphy, 97 U. S. 125, 24 L. Ed. 935.”

The Court of Appeals for the Eighth Circuit in the case of National Hollow B. B. Co. v. Interchangeable B. B. Co., 106 Fed. 693, 712, says:

“The brake beam of Hien proved to be the most efficient and successful. It went into more extensive use than any which preceded or competed with it. Its principle, its mode of operation, the conditions which distinguish it from all others, are the combination of a tension member with threaded nuts which extend through the ends of the hollow metallic compression member, through caps on the ends of the latter, and through nuts, with the compression member, the caps and the nuts, so that the turning of the latter may produce, maintain, and adjust the rigidity of the structure, the resilience, of the beam, and the coning of the faces of the brake shoes to the tread of the wheels. This structure is not the mechanical equivalent of any brake beam which preceded it, because none of them contains these conditions; no one of them has the combination of these elements in this way: no one of them has the ends of its tension member passing through the ends of its compression member, and through caps and nuts, so that the mere turning of the latter may lock the parts together and produce, maintain, and adjust their relation and action. And here is the measure of the restriction of the meaning of the term ‘mechanical equivalent’ by the prior art, and the key

to the true interpretation of that term in its application to the invention secured by the first patent to Hien. Every structure and combination which *adopts the principle, the conditions which distinguish this combination from those which preceded it*, every brake beam which combines the tension member and its threaded ends with the hollow metallic compression member, the caps, and the nuts, so that the ends of the tension member pass through the ends of the hollow metallic compression member, through the caps and the nuts and so that the mere turning of the latter may lock the parts and may produce, maintain, and adjust the rigidity of the structure, the resilience of the beam, and the coning of the shoes to the tread of the wheel, *is the mechanical equivalent of the combination of this patent, and an infringement of the franchise it grants."*

In *Parker v. Stebler*, 177 Fed. 210, 214, this court said:

"We think, in view of the prior art, that the Bryan invention marked a distinct step in advance, whereby a notable success was achieved, and that its claims are entitled to a fairly liberal construction. The idea of so arranging the clamping irons that they were brought into engagement with the load by the depression of a foot-lever, after which they were held in position by the tension created by their own weight, thus dispensing with further application of power to the lever or a locking device to hold them in place, was of such novelty and merit as to justify its protection as against a mere change of form or a different location of the clamping irons or any variant construction of substantially the same device."

The bearing-faces or inthrust bearings against which the inthrust bearing-faces 18 of the Double slips or cutters bear are arranged on opposite sides of the extension or lower end of the body. In claims 1 and 2 these inthrust bearings or "parallel bearing-faces" are referred to as "opposite" to one another. This is in the sense that they are on opposite sides of the extension or end portion of the reamer, there bearing one such face for each cutter or slip. In this same sense the slips or cutters are arranged on opposite sides of the extension or opposite each other. As there are two cutters in the Wilson reamer and as these cutters are arranged opposite each other and are thrust inward toward each other by certain impacts and strains in reaming, the bearings 9 of the Wilson reamer must be arranged opposite each other to receive such inthrust from the respective cutters. This emphasizes the similarity both of function, interrelation and location of the opposite bearing-faces of the Double and Wilson reamers and shows their equivalency.

There can be no support for any contention that claim 1 is anticipated nor can there be any successful showing that any prior successful (or unsuccessful device for that matter) limits claim 1 to any detail of form for its novelty, thus differentiating it from the equivalent combination of the Wilson and Wilson Improved reamers.

Judge Cushman in his opinion has referred at length to the fact that the description or specification of the Double application was amended to more clearly describe and set forth the action of the cutters or slips on

the key or head of the spring-actuated rod. On page 55 of the record, His Honor refers to this amendment. The term "tilt-slips" appears in both claims 1 and 2. The fact that in this same sense the Wilson reamers embody "tilt-slips" is conclusively shown by the drawings of the Wilson patent, which were made according to the testimony of Mr. E. C. Wilson and according to the file wrapper and contents of the Wilson application, from working drawings to scale of the Wilson reamer.

Claim 6.

DOUBLE.

A mandrel 1 furnished with a hollow slotted extension, the lower end of which slopes upward.

Tilt-slips 15 connected with the mandrel and furnished on their inner faces with projections 18, the

WILSON.

A mandrel 1 furnished with a hollow slotted extension (the rod 5' plays up and down in a hollow space between the dovetails or shoulders 2" on the extension and the head of the rod extends out into the slot at either side between the dovetail shoulders 2" on each side of the slipways for the same purposes as in the Double reamer); the beveled end portions 17 are upward slopes.

Tilt-slips connected with the mandrel and furnished on their inner faces with projections 4³, the upper

upper faces 26 of which slope downward to slide upon the extension (specifically on the faces 25).

Means (the spring-actuated rod 11 and key 17 together with the keyseats or sockets 16 "somewhat larger than the key 17") connecting the slips with the rod.

faces 16 of which slope downward to slide upon the extension (specifically on the beveled portions 17).

Means (the spring-actuated rod 5' and head or key 5 together with the keyseats or recesses 18 which are "somewhat larger than the key 5") connecting the slips with the rod.

So far as the elements of this combination are specifically described in the claim the Wilson reamer corresponds exactly. When reference is had to the particular facts or elements and to *their forms* as shown and described in the patent in suit, true mechanical equivalency is apparent. Under the rule of *Bates v. Coe* infringement of claim 6 is clearly established. Not even a *liberal* application of the equivalents is required. This combination is found almost identical.

It will be noted that claim 6 does not contain any words describing the intrust bearings as "parallel bearing-faces" so that defendant's contentions based upon these descriptive words do not apply to this claim. Nor does claim 6 contain any description of the slipways or tiltways as inwardly or upwardly inclined. Neither of defendant's criticisms apply to claim 6. It is beyond even such cavil that the combination called

for by this claim is clearly present in the Wilson reamer.

This sixth claim broadly calls for the combination in an underreamer of the open slipway construction and the "tilt-slip" actuation.

The Wilson underreamer unquestionably has its body extended at its lower end in two slipways. There is a hollow in which the spring-actuated rod 5' slides and there are open slots communicating to this hollow and these open slots (slipways) are at this lower portion of the reamer body, i. e., that portion which is extended downward below the shoulders 10'. The Wilson bits or cutters are "tilt-slips" as described in the Double specification; see for example page 1, column 2, lines 75-99 thereof.

To contend that the hollow in which the rod works and the slot in which the key or head and tilt-slips slide or work cannot be merged so as to form a continuous open space without destroying the presence of both is absurd. The opening in the Wilson reamer performs perfectly the function of a space (hollow) for the movement of the rod 5' and for the key or head 5 and shanks of the cutters 4. These are the functions of the hollow and slot construction produced by Mr. Double. The court will look at things in the light of what they do and what function they perform, as said in *Bates v. Coe*, and find two things substantially the same when they perform substantially the same office or function in substantially the same manner. If identity were required the entire doctrine of equivalency would be rendered nonsensical and mere surplusage for if identical

the two things would be the *same*,—not merely equivalents.

The more carefully the elements and the interrelation of the elements of claim 6 are studied,—the more carefully their functions and co-operative action is digested the more clearly it is demonstrated that the Wilson reamer embodies *practically* the same elements co-operating together for the same purpose to produce the same functions, results and actions.

The merging of the hollow and the slot, as claimed by defendant, would indeed be only the merging into one part two parts and not avoid infringement under the authorities cited in considering claim 1.

Judge Nelson in *Tatham v. Le Roy* (2 Blatchf. 486) says:

“Formal changes are nothing,—mere mechanical changes are nothing; all these may be made outside of the description to be found in the patent, and yet the machine, after it has been thus changed in its construction, is still the machine of the patentee, because it contains his invention, the fruits of his mind, and embodies the discovery which he has brought into existence and put into practical operation.”

The question to be determined is: Has the defendant appropriated the essence of the Double invention? As said in *Stebler v. Riverside Hts. Assn.*, 205 Fed. 735:

“The mere fact that there is an addition, or the mere fact there is an omission, does not enable you to take the substance of the plaintiff’s patent. The question is not whether the addition is material,

or whether the omission is material, but whether what has been taken is the substance of the invention.”

As said in *Eck v. Kutz*, ¹³²~~135~~ Fed. 758:

“The question is whether the inventive idea expressed in the patent has been appropriated; and, if it has, infringement has been made out.”

Where did defendant secure the elements and features of its Wilson reamers consisting of the “tilt-slips” and the open-sided slipways and the interrelated dovetailed shanks of the cutters and on the slipways? These are not found in combination with each other in the art prior to Mr. Double’s invention. Mr. Elihu C. Wilson testifies that he had the Double reamer before him when he produced the first Wilson reamer. That he was seeking to improve the Double reamer. The only answer to complainants’ question is that the combination of these features and elements was copied from the Double invention. In fact Mr. Wilson’s testimony is a virtual admission of this. Remove these dovetailed open slipways and the interrelated dovetails on the cutter-shanks from the Wilson reamer and it becomes absolutely useless. There is no known substitute. Mr. Double produced this. Defendant appropriated it.

Defendant gives its praise to the prior art and to unsuccessful abandoned experiments. It imitates complainants’ successful invention.

As said by the Supreme Court in *Diamond Rubber Co. v. Consolidated Rubber Co.*, 220 U. S. 444:

“Yet the rubber company uses the Grant tire. It gives the tribute of its praise to the prior art;

it gives the Grant tire the tribute of its imitation, as others have done. And yet the narrowness of the claims seemed to make legal evasion easy. Why, then, was there not evasion by a variation of the details of the patented arrangement? Business interests urged to it as much as to infringement. We can find no answer except that given by the tire company. 'The patented organization must be one that is essential. Its use in the form described and shown in the patent must be inevitably necessary.' "

How does defendant justify the use of the tilting slips and the open slipways with their dovetailed relations to the shanks of the cutters? Why does it pirate both or either of these novel features of the Double invention?

Claim 7.

DOUBLE.

WILSON.

"A hollow mandrel 1 (hollow to accommodate the spring 10 and rod 11) "provided with a slotted extension" (that portion below the shoulders 8 and slotted to permit the play of the key or head 17 of the rod 11 and forming the slipways for the sliding of the cutter shanks)

"A hollow mandrel 1, (*hollow* to accommodate the spring 6 and rod 5') "provided with a slotted extension" (that portion below the shoulders 10' and slotted to permit the play of the head or key 5 of the rod 5' and to form the slipways for the sliding movement of the cutter shanks)

“a spring-actuated slip-operating rod 11” “provided with a pivot-key

17.

“tilt-slips” 15 “provided with keyseats” 16 “adapted to be engaged by said pivot-key” 17, “said keyseats” (16) “being somewhat larger than the key” (17) “to allow the slips to tilt”

“said slips provided with inwardly-projecting shoulders” 18

“and said slotted extension provided with (the rounded surfaces 25 and in-thrust bearings, the latter designated as “parallel bearing-faces” in claims 1 and 2) “adapted to tilt said slips and hold the same in expanded position.”

“a spring-actuated slip operating rod 5’,” “provided with a pivot-key 5”

“tilt-slips” 4 “provided with keyseats” (sockets 18) “adapted to be engaged by said pivot-key” 5 “being somewhat larger than the key” (5) “to allow the slips to tilt.

“said slips provided with inwardly-projecting shoulders” 4³

“and said slotted extension provided with surfaces” 17 and 9 “adapted to tilt said slips and hold the same in expanded position.”

This comparison of the combination of claim 7 element for element and function for function and interrelation for interrelation with the parts of the Wilson reamer discloses no material or substantial difference or differences. Without any broad application of the doctrine of equivalency *the combination* and every indi-

vidual element of the claim is found in the Wilson reamer. In fact unquestionably claim 7 would have been completely anticipated by the Wilson reamer had the latter been prior to Mr. Double's invention. Claim 7 would have been incorporated, as it stands and without modification even of words, into the Wilson patent *save and except* for the fact that such combination had been taken by Mr. Wilson boldly and bodily from the prior Double reamer and was not new or novel when Mr. Wilson applied for the Wilson patent.

The utter absurdity of defendant's contention that the Double patent claims by their terms limit the "downward extension" of the mandrel or hollow body 1 to the central parallel surfaces which lie inside the slipways and extend from the shoulders 8 to the end of the reamer, is further apparent when it is observed that the only portions of such downward extension that have any functions in the combinations called for by the claims are:

1. The open-sided dovetailed slipways.
2. The intrust bearings or "parallel bearing-faces" against which the surfaces 18 of the cutters bear when expanded.
3. The rounded lower end surface 25 upon which the shoulders 26 of the cutters ride in expansion.
4. Hollow to allow the rod 11 to work up and down.

Bearing in mind the rule of *Bates v. Coe* that in patent law we look at the devices in the light of what they do and what function or office they perform, and

stumble not at mere names or terms and determine that two things are the same when they perform substantially the same office or function in substantially the same way, it is clear that the Wilson underreamer has not only a “downward extension” but also a “hollow slotted extension” in the same sense and for the same purpose as in the Double patent and as claimed therein.

It is indisputable that the Wilson reamer is extended downward below the shoulders 10'. It certainly does not end at the shoulders 10'.

It certainly is hollow below the shoulders 10' to permit the rod 5' to work or move up and down therein.

It certainly is slotted below the shoulders 10'. Both in the sense that the head or pivot-key 5 may work up and down and in the sense of providing open slipways.

The intrust bearings 9 and the rounded or beveled portions 17 are on the lower end of this extension and for the same purposes as in Mr. Double's embodiment of his invention.

All these are for the same purposes and have the same offices or functions as the downward extension 6 of the Double patent and the operative interrelation with each and with the cutters and with the rod and pivot-key or head are the same as in the Double. It does not require a liberal application of the doctrine of equivalency to show the infringing character of the organization of the Wilson reamer.

Claim 8.

It will doubtless be sufficient to call the attention of the court briefly to such differences as exist between claims 7 and 8.

The first difference is one more of words than of substance. In claim 7 the *extension* is described as a "*slotted extension*" while in claim 8 it is termed a "*hollow slotted extension*." As in either case provision must be made for the movement up and down of the spring-actuated rod this is seen to be really a distinction without a difference. The extension must be hollow to accommodate the rod. The substantial difference in terms is in the omission from claim 8 of the descriptive term "*inwardly*" as applied to the projections 18 on the slips, which projections bear against the extension so that the latter takes the intrust in underreaming. The wording of this claim 8 in this respect is more indefinite or to adopt for this illustration the terminology of defendant's counsel "broader." In claim 8 the slips or cutters are called for as having simply "projections which bear against said extension." This avoids the hypercritical contention made by defendant's counsel in regard to "*inwardly* projecting shoulders" on the cutters. Clearly the shoulders 4³ of the Wilson cutters are "projections which bear against" the downwardly extended portion or end 9 of the reamer and these end portions 9 are clearly downward extensions and below the shoulders 10'.

The Double invention and patent are to be construed and considered

"according to the advance it has made in novelty and utility beyond the former art."

Vrooman v. Penhollow, 179 Fed. 297, 299;

Penfield v. Chambers Bros. Co., 92 Fed. 639;

McSherry Co. v. Dowagiac Co., 101 Fed. 716.

Whatever may be said of the prior makeshifts,—the Austrian, Swan, Kellerman, etc., reamers,—whether considered as successful or unsuccessful, it is conclusively proven that the Double invention substantially displaced them all from use. This fact conclusively proves the importance and broad newness or novelty of the Double invention and that it was an invention of high importance in the well drilling art and entitled to the favor of this court.

~~As said by the Supreme Court in Hobbs v. Beach,~~
~~80 U. S. 389:~~

"If there be one central controlling purpose deducible from all these decisions, and many more that might be quoted, it is the steadfast determination of the court to protect and reward the man who has done something which has actually advanced the condition of mankind, something by which the work of the world is done better and more expeditiously than it was before." *See 160 Fed. Rep. at page 9*

"The object of the patent law is to secure to inventors a monopoly of what they have actually invented or discovered, and it ought not to be defeated by a too strict and technical adherence to the letter of the statute or by the application of artificial rules of interpretation."

Topliff v. Topliff, 145 U. S.

As said by the Supreme Court in Webster Loom Co. v. Higgins (105 U. S. 580, 591):

"But it is plain from the evidence, and from the very fact that it was not sooner adopted and used, that it did not, for years, occur in this light to even the most skillful persons. It may have been

under their very eyes, they may almost be said to have stumbled over it; but they certainly failed to see it, estimate its value, and bring it to notice.
* * * Now that it has succeeded, it may seem very plain to anyone that he could have done it as well. This is often the case with inventions of the greatest value.”

Defendant makes a strenuous attempt to pervert the plain meaning and intent of the term “hollow slotted extension” as used in claims 6, 7 and 8. In fact it must strike the court in considering defendant’s brief that most of defendant’s propositions and contentions are based on strict and technical meaning of words and terms, without regard to substance. It must be apparent that defendant’s attempted interpretation of the Double patent specification and claims is diametrically opposed to the rule of *Bates v. Coe*, that the court should look at the device and elements in the light of what they do and what office or function they perform, not determine them by names or mere words.

Mr. Knight undoubtedly hits the nail on the head in regard to the meaning of the “extension 6” of the Double patent. He testifies:

“Q. 48. In the Double underreamer you have referred to a downward extension having opposite parallel bearing-faces having a keyway therein. Is there anything in the Wilson underreamer corresponding to this; if so, point it out.

A. Referring to the Wilson patent for identification of the parts, the downward extension consists of the prongs 2, with the cross-piece 11, connecting the same, and the parallel bearing-faces

with this downward extension are represented in this patent by the bearings 9, which are so slightly inclined that they perform the function of parallel bearing-faces. And the keyway in the downward extension of the Wilson patent is represented by the open space or portion of the open space between the prongs 2, within which space the cross-head 5, on the spring-actuated rod travels vertically, this being the function of the keyway in the Double patent.” [Record p. 742.]

“In referring to ‘Complainant’s Exhibit Double Patent,’ I do not find any exact definition in the specification of this downward extension except by reference to a number on the drawing and by a statement of its functions. The number is number 6. That term hollow slotted extension must refer to No. 6 in the specification. The hollow in this extension is a space or hole in which the spring-actuated rod plays.

Q. 57. And the slot in this extension is the opening cut through this extension and through this hollow and in which the key plays vertically, is it not?

A. That is a portion of the slot, yes, sir.

Q. 58. I am only talking now about the slot in the part which the specification discloses, as you have testified, as an extension. That slot is the one I have referred to in my last question, is it not?

A. I take it that the slot you are referring to is the slot numbered 7 in the drawing, and referred to in the specification in some places as a keyway.

Q. 59. That is the one I am referring to, yes.

A. This is only a portion of the slot in the hollow slotted extension.

Q. 60. Where is the rest of that slot?

A. In those portions of the extension which are at each side of the transverse portion to which the leader line from the numeral 6 leads. I will say in this connection that in patent office drawings, wherever a part is shown partly in section and partly in elevation at the back, it is usual to apply the numeral to the part shown in section, unless otherwise it would lead to confusion; and therefore I take it that this numeral 6 only identifies the downward extension as a whole while referring to this part of it which is presented in section in the drawing.

Q. 61. The upwardly and inwardly sloping tapering dovetail slipways on the body and the shoulders on the body which receive the upthrust of the cutters, are given separate and independent reference numerals in the specification of this patent, are they not?

A. Yes, but this is the universal practice in the patent drawings, to apply additional numerals to subordinate parts of a member which has already been given a numeral designating it as a whole; in fact, the specification of the Double patent may be read as indicating the slipways either as the channels in which the tilt slips travel or as the confining walls which form such channels.

Q. 62. And these parts are given a distinct and separate reference identification in the Double patent specification, are they not?

A. Yes, sir.

Q. 63. And there is no statement in this specification that these parts, nor the parts or shoulders, 8, come within the broad designation of 'hollow slotted extension,' is there?

A. I do not find in the specification any definite

reference to the hollow slotted extension, so I cannot answer the question.

Q. 64. Do you find anywhere in the specification of this patent any reference to the shoulders, 8, or the slipways, 9, or either of them, as being part of the extension, 6?

A. I think that the statement in lines 50 to 55, page 1, of the Double specification, is capable of being read in the sense that the shoulders, 8, and the slipways, 9, are a part of the extension along with the oppositely arranged parallel bearing faces and the key way, 7, therein, the language being as follows: 'A downward extension 6, with oppositely arranged parallel bearing faces having a key way 7, therein, shoulders 8 at the sides of such extension, and upwardly and inwardly sloping tapering dove-tail slipways 9 beneath said shoulders.'

Q. 65. The shoulders, 8, are unaltered portions of the stock of the hollow mandrel or body, 1, are they not?

A. They are portions of the body, 1, but I could not say that they are unaltered, since they are formed by the cutting away of the portions of the body to form the extension and mark the upper limit of the extension.

Q. 68. Now, in 'Complainants' Exhibit Wilson Reamer,' or 'Complainants' Exhibit Wilson Reamer No. 2,' do you find any part like the part identified and described as the extension, 6, in 'Complainants' Exhibit Double Patent'?

A. Before answering that question I would have to know whether you limit the extension, 6, to the transverse portion extending between the slip ways or to the extension downwards from the hollow body below the thrust-shoulders.

Q. 69. I limit it to the part to which the leading line to the reference character 6 extends in the drawing of the Double patent in suit, namely, the part having flat parallel outer faces, a vertical internal hollow, and a vertical transverse slot cutting such hollow.

A. According to the definition you have given—read that question before that, please. (Question No. 68 read by the reporter.) According to the definition you have given in your question of this extension I find substantially the same extension in the 'Complainants' Exhibit Wilson Reamer' and 'Complainants' Exhibit Wilson Underreamer No. 2.'

Q. 70. Please describe such extension, referring to such exhibit.

A. This extension consists of the portion of these underreamers which is below the thrust-shoulders at the upper ends of the prongs and includes these prongs, the cross-piece or bolt near the bottom of the prongs, and is formed with an internal space between the prongs, which is both a hollow for receiving the spring-actuated rod and a slot for receiving the key or cross-piece on said rod and for receiving the shanks of the cutters.

Q. 71. The hollow and slot referred to are one and the same open space, are they not?

A. Yes, sir.

Q. 72. Where are the parallel flat faces of this extension as you testify you find it in the Wilson underreamer?

A. They are near the lower ends of the prongs just above the spreading-bearings, these being substantially parallel to the extent that they perform the function of parallel faces as thrust-bearings.

Q. 73. They are not parallel, are they?

A. Not absolutely.

Q. 74. And there are four of such faces, are there not?

A. Yes, sir.

Q. 75. And there is an entirely open space between the adjacent edges of the faces of such parts, with the exception of the round cross-bolt, is there not?

A. Yes, but this does not in any way affect the mode of operation of each pair, which acts in effect as a single bearing face.

Q. 82. Now, defining the extension of the Double patent structure as the part 6 having outer flat parallel faces and a longitudinal hollow and a longitudinal transverse slot, the slip ways, 9, are on the body, 1, and an integral portion thereof, are they not?

A. If you mean by this that they are on the body and not on the extension, I do not think so.

Q. 83. They are not on the extension, 6, as defined in my last question, are they?

A. Yes, sir, in my opinion they are.

Q. 84. What connects them with the extension, 6?

A. As shown in figures VII, and VIII they are integral with the extension, 6, and form an integral portion thereof.

Q. 85. And they are likewise integral with the hollow mandrel or body, 1, are they not?

A. Yes, sir." [Record, pp. 744-749.]

In the limited time at complainant's disposal since this case was set for argument, and since appellant's opening brief has been served, it has been impossible to as thoroughly brief this case as complainants have desired. It will, therefore, be impossible for complain-

ants in this brief to answer in detail appellant's opening brief.

Appellant's opening brief very apparently submits appellant's appeal upon an absolute misconception and misunderstanding of the decision of the trial court, or upon an absolute intentional perversion thereof.

Appellant refers in its opening brief and quotes from Judge Cushman's opinion the paragraph, commencing with the last line of page 54 of the record, as follows:

"None of the underreamers of the prior art combine cutters tilting over the lower end of the reamer body with shanks having dovetails so interrelated with dovetail ways, upon the body of the reamer as to afford inner, outer and lateral bearings when in reaming position."

Instead of interpreting this paragraph with an intent to apply Judge Cushman's meaning or to apply a reasonable meaning, defendant attempts to assert that Judge Cushman has fallen into grave error as to the mechanics of the Double reamer and of the Wilson reamer. Defendant attempts to interpret this paragraph to mean that the "dovetail ways upon the body of the reamer" form or afford "inner, outer and lateral bearings when in reaming position."

Reading the paragraph in the light of what has been said by Judge Cushman and in the light of what he is referring to, it is clear that Judge Cushman *does not* say that the dovetail ways alone afford these inner, outer and lateral bearings, but says that the interrelation between the cutters *and* the lower end of the reamer body *and* the dovetails on the cutters, *and* the

dovetails on the open slipways thus forming dovetail ways, together afford the inner, outer and lateral bearings. And Judge Cushman is correct. "The lower end of the reamer body" affords part of these bearings; the interengaging dovetails (of the shanks of the cutters and of the slipways or dovetail ways) afford certain of these bearings.

But defendant would interpret this paragraph to read:

"None of the underreamers of the prior art combine cutters tilting over the lower end of the reamer body with shanks having dovetails so interrelated with dovetail ways upon the body of the reamer *that the shanks of the cutters* afford inner, outer and lateral bearings when in reaming position."

The open slipways form lateral or side bearings so that side twist of the shanks of the cutters is resisted. The interengaging dovetails of the cutter shanks and dovetail ways or open slipways form outer bearings resisting any tendency to pinch the cutting ends of the cutters together and thereby throw out the shanks of the cutters from the dovetail ways or slipways. This is true in both the particular embodiment of the Double invention shown in the patent in suit and in the Wilson embodiment thereof. The inner bearings referred to by Judge Cushman may well be the inthrust bearings of the cutters on the "lower end of the reamer body," which are "interrelated" with the cutters he refers to.

One of the difficulties in interpreting any general statements in regard to the various bearings of these reamers is that there are several bearings which may

be referred to by the same general term. One of the most important bearings of the entire reamer is the *upthrust* bearing of the cutter which takes practically all of the impact of the reamer in operation. We now refer to the direct impact tending to drive the cutter up into the reamer body. This is resisted by an *inner* bearing. This inner bearing is formed in the Double invention by the shoulder 8 within and at the upper end of the dovetail ways or slip ways and the part of the bit which contacts therewith is the upper end of the shank of the bit.

If, therefore, Judge Cushman's language is not to be interpreted as we have just indicated, but is to be referred to *inner* bearings formed by the dovetail ways or slipways, it is this upthrust bearing formed at the upper end of the dovetail ways to which he refers. This upthrust bearing is formed by the open dovetail slipways of the Wilson reamer in the same manner and for the same purpose and performs identically the same function as in the Double invention, for it is the Wilson shoulder 10 at the upper end of the dovetail ways 3 which takes the upthrust.

The entire statements on pages 16, 17 and 18 of appellant's opening brief are thus shown to be erroneous and based upon a false premise and appellant's criticisms of Judge Cushman's opinion are shown to be based upon a misinterpretation and perversion of such opinion. To say the least, such brief is highly misleading.

While appellant's opening brief relies upon the Jones round nose abandoned experiment, the O'Donnell & Willard abandoned experiment, and the Brown inopera-

tive and impractical device as the prior art limiting the Double invention, yet appellant is inaccurate and would apparently indicate an intention in its brief to have erroneous inferences drawn from its references to these unsuccessful devices.

It is to be noted, in connection with both the O'Donnell and Willard abandoned experiment and with the Brown impractical theory, that no such upthrust bearings as we have last discussed and as are thus referred to by Judge Cushman were provided or suggested to be provided in either of these attempts to produce an underreamer. In the Brown patent (Book of Exhibits, pp. 284-286) the upthrust bearings for the cutters are formed by the end portions 10 of the body (see Fig. 1 and Fig. 2). The upper ends of the shanks of the cutters do not contact with these shoulders 10. On the contrary the bodies of the cutters are provided with shoulders 15. These shoulders 15 are not above the point of suspension of the cutters on the slide or rod 3 as in the Double invention, or in the Wilson infringing reamers. The mode of operation is entirely different in this respect. This is also true of the O'Donnell and Willard reamer, as will be readily seen by reference either to the O'Donnell and Willard abandoned experiment in evidence or by reference to page 144 of the Book of Exhibits, Fig. 3, wherein the bodies of the cutters are shown as provided with shoulders 15 to fit against the lower end of the stock or body when the cutters are in expanded position. (See specification, page 146, commencing line 99.) This is one of the features of inoperativeness and impracticability in both

the Brown theory and in the unsuccessful O'Donnell and Willard abandoned experiment.

The location of these inner or upthrust bearings on the body of the reamer within and at the upper ends of the open slipways or dovetail ways and the provision for the upper ends of the shanks of the cutters to directly abut against such upthrust bearings was one of the departures by Mr. Double from the Brown failure and from the O'Donnell and Willard failure which marked the difference between success and failure. (In law had the O'Donnell and Willard reamer been a success and its use been actual public use before Mr. Double's invention, the law would have presumed Mr. Double to have had it before him. In actual fact Mr. Double never heard of this O'Donnell and Willard failure until years after his reamer had been on the market.)

In order to so take the upthrust on the upper ends of the shanks of the cutters it was necessary that these be entirely changed over not only in function but in form and action, from the shanks of the cutters of the Brown theory or the O'Donnell & Willard failure. The connection between the spring-actuated rod and the cutters must be lowered and sufficient material put into the shanks above the sockets or seats for the connecting key or tee-head of the rod, to form a substantial bearing surface to withstand this upthrust. This change necessarily resulted in providing quite a portion of the shank of the cutter above the fulcrum on the key or tee-head. Consequently when the bits or cutters were collapsed, as the lower or cutting ends swung in toward the center of the body, these upper end por-

tions above the key or tee-head must tilt outward. This action is illustrated in the Double patent (Book of Exhibits, p. 2) in comparing the positions of the upper ends of the shanks of the cutters in Figs. I and III, and the corresponding tilting action in the Wilson reamer is correspondingly illustrated by reference to the Wilson patent (Book of Exhibits, p. 278) and to the positions of the upper ends of the cutters in Figs. 1 and 3. Compare this action with that illustrated in the drawings of the Brown patent for instance (Book of Exhibit, p. 284). There has been no tilting action in this sense of extended cutter shanks. There could be none, for the upthrust bearings of the bits or "reamers" II are arranged way below the point of suspension of pivot. Judge Cushman was correct in stating that the mode of operation of the Brown cutters was different from that of the tilt slips used in the Wilson reamer thus embodying the Double invention. (Bearing in mind also in this connection that the Brown mode of operation and construction was a suggestion only that it was impractical, inoperative and a failure.)

The statement of appellant's brief (bottom of page 5), that the trial court did not understand the tilting action of the Double bits or this purely pivoted action of the Brown bit is thus found to be incorrect. The further statement that the trial court "admitted that in all other respect the Brown invention was an anticipation of the Double invention in regard to the tilting action of the cutters," except in the travel of the cutters upwardly and downwardly, is untrue and misleading. In fact appellant's counsel does not seem

to understand Judge Cushman's decision, or the mechanics of either the Double invention or of the Wilson reamer, or Mr. Brown's proposed reamer.

Judge Cushman says of these Brown proposed cutters:

"But they are suspended—not by means of a key-seat in a recess in the shank of the cutter larger than the key, as in the patent in suit, but the upper end of the cutter shank is formed into an inner shoulder hooked over an exterior shoulder on a spring actuated box open at its lower end, allowing it to travel downward with the cutters, over an interposed portion of the body." [Record p. 53.]

Reading this in connection with the paragraph commencing with the last line of page 56 of the record, Judge Cushman's entire understanding of this matter is clear, for he says:

"It is necessary that they be so freely suspended on this rod as to permit them to tilt forward and back; over and upon the lower end of the extension. In the Brown device, this was accomplished by an inwardly projecting shoulder upon the upper extremity of the cutter, fitted or hanging upon a shelf or shoulder extending from the spring-actuated box into the cavity provided for the accommodation of the cutter shank.

In the Double device, the key carried by the rod loosely fits in the hole in the upper part of the inner face of the cutter shank. In operation, as the rod carries the cutters up into the reaming position, the cutters will travel together, for the rod, with the aid of the key inserted in each shank, would control each cutter. But as the box upon

which the cutters hang in the Brown device travel downward, the cutters do not, necessarily, travel with it, *save by their own weight*. The expansion on the end of the rod would keep them from falling out, but it would not bring them down with it, together.

The foot of the casing, which forces the cutters down in collapsed position, might become jammed out of shape so as not to be uniform on both sides, or rocks or other substances might get between the foot of the casing and the outer shoulder of the cutter, resulting in one cutter being carried down ahead of the other, if anything interfered with the descent of such other.

This shows such a difference in the method of operation as to prevent anticipation of the Double invention by the Brown. It is, therefore, obvious that, as Brown invented one 'means' and Double another 'for tilting the slips,' the Commissioner of Patents rightfully rejected Double's broad claim to all means 'for tilting the slips,' which would have included the means invented by Brown."

The defense asserted by appellant's opening brief is clearly that the Double invention was one of details of constructions only and that the claims of the patent in suit "must be limited to the specific combinations of elements" in their specific forms shown in the drawings of the Double patent. That the court must hold the Jones round nose abandoned experiment was a practical and successful reamer and that it is proven to have a place in the prior art. That the court must hold that the Brown theory was an operative and successful reamer. To do this it must fly in the very teeth of all of the testimony. *No witness in the case*

has even asserted that a Brown reamer could be manufactured or could be used. None was ever made nor was one ever used. It was condemned as impractical. It was clearly only an exposition of a theory and falls most certainly within the category of the Crosby patent which this court held did not anticipate the Pettit invention.

Kings County Co. v. U. S. Con. S. R. Co., 182
Fed. 59.

The statement on page 23 of appellant's brief that there was a Brown reamer constructed in accordance with the Brown patent in Mr. Double's possession before Mr. Double's invention is false. There was a wooden model which showed the Brown theory impractical.

The court to sustain defendant's position must hold that the O'Donnell & Willard inoperative and unsuccessful abandoned experiment was a practical and successful reamer, although the proofs show that it was unsuccessful and was abandoned by the inventors.

It is on such flimsy, discarded, unsuccessful attempts to provide a practical underreamer that defendant asks this court to piece-meal eliminate the broad novelty, which made success, from the Double invention. It is submitted that Judge Cushman, instead of not giving effect enough to Mr. Brown's theory, gave it in fact greater consideration and greater weight than that to which it was entitled, in view of its impractical character. Judge Cushman found it had been proven a failure. [Record p. 886.]

Judge Cushman also recognizes the fact that if an attempt were made to use Brown's proposed suspen-

sion of the cutters in connection with open slipways, there would be nothing to prevent the entire upper ends of the cutters from being pinched out through the slipways. There would be nothing to prevent the cutters falling out of the reamer when it was attempted to be operated. There can be no ground whatever for asserting that Brown conceived the idea of forming outer bearings by dovetails or shoulders on the sides of open slipways and forming dovetails or shoulders on the shanks of the bits, to keep the cutters from falling out of the reamer through the open slipways. It is therefore submitted that Judge Cushman was justified in saying that in his opinion:

“As already pointed out, the chief novelty and utility of the Double invention over the prior art was the combination of the interrelated dovetails on the cutter-shank and ways therefor on the body of the extension, with the means by which the tilting action of the cutters over the lower end of the body was accomplished.”

Appellant cites and refers to the decision of this court in *Western Engineering & Construction Co. v. Ridsen Iron & Locomotive Co.*, 174 Fed. 224, but very apparently misunderstands and misinterprets that decision. In that case His Honor Judge Ross was of the opinion that the patent was not infringed because of limitations during the prosecution of the application in the patent office. Judge Gilbert stated that he was unable to agree with Judge Ross' conclusions. Judge Gilbert held that there was no infringement because there was a total change in the mode of operation, saying:

"It is evident that if, in the operation of the appellant's device, the selective action so attributed to the appellee's invention is secured, and fine particles of gold are forced ahead of the other mass of material through its grizzly by the selective action of the jets of water, the advantage thereof is wholly lost by depositing and commingling the whole mass which emerges from the grizzly into a collecting box or hopper before it is conducted upon the riffles or the saving devices. If, in other words, there has been a selection of the metal by the force of the jets through the perforated pipe of the appellant's grizzly, it is nullified by the general commingling of the whole mass under the grizzly before it flows upon the saving devices. In view of this fact, it is clear that the appellant does not infringe the appellee's patent."

Judge Hunt agreed with Judge Gilbert.

In the present case there has been no total change of the mode of operation of the combination as embodied in the Wilson reamer. There has been no total loss of the very action alleged to be the novelty of the Double invention. In fact, while there has been a slight change in some of the relations of the parts, the mode of operation of the Double invention has been retained. This decision is not, therefore, an authority sustaining appellant's position.

Too much care cannot be exercised in considering the various inserted cuts and drawings in appellant's opening brief. Take for an example the one appearing opposite page 23. This drawing is not true of the "Double reamer," "Wilson reamer" or "Brown reamer" alleged to be exemplified. This is clearly demon-

strated by comparing the drawings of the Double patent in suit, the drawings of the Wilson patent, and the drawings of the Brown patent with these illustrations. While the illustration first appearing in said brief of the O'Donnell & Willard abandoned and unsuccessful attempt, "Fig. 1," is taken from the patent, it shows the cutters or bits in a position which they only assume under extraordinary circumstances. Their action is a sliding action, sliding upward or downward the wedge 3 and any rocking or tilting is only after the cutters have reached the extreme of their downward movement, and due to unusual pinch. However this would be but a piece-meal attempt at anticipation. The O'Donnell & Willard reamer, confessedly has no open slipways, nor has it the combination of either of the claims of the Double patent, nor has it the principle or mode of Double's operation. This is made clear by Mr. Knight's testimony, as follows:

"O'Donnell & Willard patent, 762,435. In this patent the body of the underreamer is provided with a tapering bowl at its lower end, and with a downwardly tapering transverse partition extending across said bowl. The cutting members are formed as jaws having upwardly tapering shanks adapted to fit in the two parts of the bowl at opposite sides of said partition; said shanks being hung on a cross-head on a spring-actuated rod mounted in a hollow in the body. The transverse partition extends below the bottom of the bowl and the cutting jaws have shoulders which engage with the bottom of the bowl to limit the upward movement of the jaws. When this tool is withdrawn into the shoe, the shoe engages with the

jaws below the bottom of the bowl; but above the bottom of the transverse partition; so that the pressure of the shoe on the jaws holds the jaws from upward movement; and the continued upward movement of the body withdraws the transverse partition from between the inclined inner faces of the shanks of the jaws. At this time the inward pressure of the shoe on the jaws keeps these inclined inner faces in tight contact with the inclined faces of the partition, 3, so that during the first part of the movement, at least, the jaws simply slide inward and downward on the partition without any tilting action. As soon as the point of contact of the shoe with the jaw passes below the inclined bearing face at the side of the partition, 3, there is a tendency to rock the lower portion of the jaw inwardly and swing the upper portion of the jaw outwardly. *This is, properly speaking, however, a rocking and not a tilting action*, as the fulcrum of the motion is not at the upper end of the jaw shank, but at the lower end of the partition; and it is due, *not to the riding of a shoulder or inwardly facing bearing of the jaw on a spreading-bearing of an extension of the body*, but to rocking of a straight flat face of the shank teetering on the rounded lower end portion of the partition, 3. This is clearly shown in figure 1, wherein, however, the rocking or teetering motion is emphasized; whereas, the characteristic motion of the jaws in this O'Donnell & Willard reamer is inward and downward sliding movement comparable to that of the Swan patent. *This patent, therefore, does not disclose the characteristic features of the Double construction*, consisting in a body having an extension, provided with spreading-bearings and tilt slips

mounted to slip and tilt in said extension; and provided with shoulders or inwardly facing projections riding on such spreading-bearings to expand and collapse the lower portions of the tilt slips. This O'Donnell & Willard underreamer further does not disclose the slotted extension of the body and the tilt slips having portions projecting through the slots of the extension so as to engage the shoe or casing at points above the lower ends of the extension and considerably above the cutting edges at the lower ends of the tilt slips so as to provide for throwing the cutting edges inwardly free and clear of the casing by engagement with the shoe of portions considerably above said cutting edges. The portions of the O'Donnell & Willard jaws which engage with the casing or shoe are so near to the cutting edges (see figure 1) that the amount of inward throw or clearance of the cutting edges would be very small, and extreme nicety in dressing the tools would be necessary in order to prevent the cutting edges from catching on slight obstructions in the casing, if, indeed, it would be possible to prevent such catching. This O'Donnell & Willard patent furthermore does not embody the dovetail slipways for furnishing outside bearings for the tilt slips when in working position while permitting projection of portions of the tilt slips to the outside of said slipways and between the sides of the dovetail slipways for engagement with the casing or shoe as stated. A spring-pressed bolt, 16, is provided in the O'Donnell & Willard underreamer to lock the cross-head on the spring-actuated rod from downward movement relative to the stock or body when the latter is drawn up, this bolt being released through the action of the pin, 21,

engaging the shoe when the reamer is drawn up within the shoe at the bottom of the casing. *This presents a different mode of operation than that of the Double patent, in which the spring-actuated rod and key or cross-head thereon are not restrained from downward movement except by the action of their supporting springs.*

In the O'Donnell & Willard patent a locking bolt, 16, is shown for locking the cross-head on the spring-actuated rod from downward movement in the body. In 'Defendant's Exhibit O'Donnell & Willard Underreamer' this locking bolt is omitted, and there are provided the parts referred to in said answer to question 351 of W. W. Wilson. This additional feature in the O'Donnell & Willard underreamer comprises a key passing through a slot in the body and extending over the top of the spring-actuated rod; the ring extending around the body and rigidly connected to this key and casing engaging means which are mounted to move in and out through the ring and slip in inclined slots on the body as they are moved vertically relatively to the body. When the reamer is drawn up into the shoe the shoe engages with these casing engaging means, holding the ring temporarily from upward movement; and, as the body of the tool continues to rise, the key, carried by said ring, engages with the top of the spring-actuated rod, to hold said rod down, while the body rises, thereby moving the cutter jaws positively downward relatively to the body and permitting them to swing in freely, the effect of this action being, as the witness stated, in answer to this question, to take the pressure of the spring off of the cutting jaws in the collapsing action: and this device being in function and effect a lock

for preventing expanding action on the cutters as they are being passed into and through the casing

Q. 30. Then the two differences in the elements, which you pointed out in your last answer, between the 'Defendant's Exhibit O'Donnell & Willard Underreamer' and the disclosure and description of 'Defendant's Exhibit O'Donnell & Willard Patent,' make what difference in the subject matter?

A. The O'Donnell & Willard patent purports to disclose an underreamer which is capable of collapsing without the use of any locking means, whereas, the O'Donnell & Willard underreamer depends for its operation upon this locking means. The mode of operation of these two exhibits is, therefore, distinct and different inasmuch as one depends on a locking means for preventing expansion of the cutters while passing through the casing, while the other does not depend on any such locking means; the locking means shown in the O'Donnell & Willard patent being to lock the cutters in expanded instead of in collapsed position.

Q. 39. Referring to 'Defendant's Exhibit O'Donnell & Willard Patent.' You have stated that the upward thrust in the underreaming, with both the Double underreamer and the Wilson underreamer, is taken at the upper ends of the shanks of the bits. Compare this with such O'Donnell & Willard disclosure.

A. The only means described in the O'Donnell & Willard patent for taking this thrust is the shoulders, 15 and 15', on the bits which engage with the end of the body. The upper ends of the shanks of the cutting jaws appear to have small flat faces which may engage on the bearings on

the body, but nothing is said in the specification as to that.

Q. 40. Referring to the 'Defendant's Exhibit O'Donnell & Willard Underreamer,' what are the facts in this respect in regard to that device?

A. (Witness again inspects said exhibit.) In 'Defendant's Exhibit O'Donnell & Willard Underreamer' these bearing faces at the upper ends of the cutting jaw shanks are not present, as these upper ends are beveled off and in the case of this underreamer the thrust-bearing is wholly at the shoulders corresponding to the shoulders, 15 and 15', in the patent.

Q. 257. Referring, now, to 'Defendant's Exhibit U. S. O'Donnell & Willard Patent.' Now, in the underreamer of 'Complainants' Exhibit Double Patent,' the cutters slide downward on the parallel flat faces of the extension, 6, in the first part of the collapsing action without any coengagement of the shoulders, 18, with the spreading surfaces, 25, is that not so, in the same manner as you say the cutters of the O'Donnell & Willard patent slide downwardly at their inner faces on the outer faces of the partition, 3, in the first part of the collapsing action?

A. Not in the same manner; no, sir. In the O'Donnell & Willard patent this sliding action carries the cutters inwardly as well as downwardly, and is the main collapsing action, so that, when it has proceeded far enough, the cutters are collapsed or approximately so; whereas, with the Double construction, this first part of the action, consisting of the sliding of the cutters downwardly, so that their bearings, 18, slide on parallel faces of the downward extension, is a direct downward movement without inward drift, and is not a

part of the inward collapsing movement, but is a preliminary movement for bringing the inside thrust-bearings out of engagement, so as to permit of the subsequent collapse by riding over the spreading-bearings. In saying, therefore, that the manner of operation of the two underreamers is not the same in this respect, I mean that *this sliding movement in the O'Donnell & Willard is the primary or proper collapsing action*, whereas, *in the Double underreamer it is simply preliminary to the proper collapsing action*.

Q. 258. Now, the cutters of the O'Donnell & Willard patent reamer can never arrive at their final collapsed positions shown in figure 1 until the lower portions of the cutters rock or tilt inwardly and the upper portions of the cutters rock or tilt outwardly and away from the outer faces of the partition, 3, such rocking or tilting being on fulcra at the lower portion of the partition, 3; is that not correct?

A. They certainly cannot assume the position shown in figure 1 without rocking on the fulcra at the lower end of the partition; but whether they would be capable of entering the casing without assuming the position shown in figure 1, would depend on the proportions of the parts. In this connection I will say that the proportions are not the same in figures 1 and 3. With the construction shown in figure 3 the cutters could slide down on the inclined faces of the partition until they are nearly collapsed; and in this position the cross-piece, 8, would be directly resting on the closed bottom portion of the partition, so that the cutters could swing inwardly under the inward pressure of the shoe; such inward movement, so far as it went, would be fulcrumed on the lower portion of

the partition, which would, in this case, act as a fulcrum and not as a spreading bearing.

Q. 259. You are talking now of collapsion of cutters?

A. Yes, sir.

Q. 260. Now, from that part of the specification embraced within lines 117 to 122, page 2, namely, 'so that when the cutters 15 15' of the jaws engage with the shoe 22' the cross-head is free to slip in the stock, thus to allow the stock to be drawn up while the jaws collapse into the position indicated in the solid lines in Fig. 1,' do you not gather that the positions shown in the solid lines in figure 1 are the positions which the cutters or jaws normally assume, within the disclosure of this patent, when in collapsed positions?

A. Not necessarily, for the reason, as before stated, that proportions of the parts in figure 1 do not agree with the figure 3; and for the further reason that the portion of the specification you refer to states that this position is 'indicated in solid lines in Fig. 1 and in dotted lines in the upper position in Fig. 3'; and in this dotted position the parts are not rocked to any material extent, at least; very slightly as compared to the position shown in figure 1.

Q. 261. But the specification of this patent goes on further to say, lines 1 to 5 inclusive, page 3, 'The ends of the cross-head have sufficient play in their sockets to allow the jaws to swing freely toward each other as the shanks withdraw from the shank sockets.' Does not this language imperatively imply and disclose a tilting movement of the cutters?

A. It implies a rocking movement of the cutters, but not necessarily a tilting movement. And

to judge from the showing in figures 1 and 3 *the movement, such as it is, would be a rocking movement fulcrumed on the lower end portion of the partition, as distinguished from a tilting movement fulcrumed at the upper portion of the cutters.*

Q. 268. And will you please point out to me wherein, from considerations of operativeness, any locking device, such as the parts 16, 20 and 21, or any other locking device, is required in the use of an underreamer, such as is disclosed in this O'Donnell & Willard patent, in either the collapse or expansion of the cutters or the lowering of the reamer through the casing, or the withdrawing of the reamer through the casing, or the use of the cutters with the same in expanded positions, any more than such locking device is necessary under similar conditions in the use of the Double underreamer? And in answering this question I wish you to state what those features are of the construction if disclosed in the O'Donnell & Willard patent, which necessitates the use of such locking device, if you find that there is such absolute necessity.

A. The principal feature in the O'Donnell & Willard underreamer which leads to the necessity of a locking device, or at least would interfere with successful operation without the use of a locking device, is the fact that the shanks of the cutters extend up within a bowl which is closed all around, so that the cutters cannot come into contact with the casing, or shoe except near their lower ends. This patent states that 'It is to be observed in figures 1 and 4 that the jaws are rounded, as at 29, so that the cutting edge of the jaws are inturned when the jaws are in their down-drawn position, so that the cutting edges

will not touch the casing during the descent of the tool.' The patentees, therefore, recognize that the bearing of the cutters on the shoe will be on this rounded portion adjacent to the cutting edges, and the clearance or inthrow of the cutting edges away from the casing is simply that which is due to the small distance between this rounded bearing of the cutter on the casing and the lower cutting edge. The feature in the Double underreamer, as disclosed in the exhibits referred to, which differentiates in this respect from the O'Donnell & Willard construction, is the provision of the slots or openings in the sides and of the downward extension of the body, through which portions of the shanks extend into contact with the casing at a considerable distance above the lower cutting edges, so as to give not only an enlargement or magnification of the inthrow or clearance by engagement of this bearing face with the casing, but to proportionately, or more than proportionately, increase the inward deviation or deflection of the cutters. It may also be stated that the rounding of the outer faces of the cutters, such as required in the O'Donnell & Willard underreamer, for any clearance at all, is not adapted to provide a good cutting edge, since it brings the outer faces of the cutting edges substantially vertical if not even inturned, whereas, they project slightly outward in order to act as an efficient cutting edge.

A. This would only be a portion of the hollow slotted extension in the Double patent, but even this portion of what I term the transversely extending portion of the hollow slotted extension, or the downward extension, is provided with a feature which I do not find in the O'Donnell & Willard partition, namely, the spreading-bearings at

the bottom of this member adapted to engage with inwardly facing bearings or shoulders on the cutters to tilt the same outwardly by a wedging action. I do not, therefore, regard these members as equivalents.

Q. 286. The lower end of the partition, 3, in the O'Donnell & Willard patent, and the lower end of the extension, 6, in the Double patent, are both rounded off so as to bulge downwardly, are they not?

A. *Yes, but the rounded lower face of the partition in the O'Donnell & Willard patent has no apparent function to perform, as it does not co-operate with any part on the cutters; and therefore is not an equivalent of the rounded lower end of the transverse portion of the downward extension in the Double underreamer, which does so co-operate.*

Q. 287. But as the inner faces of the cutters, of the O'Donnell & Willard patent reamer, rock away from the flat faces, at the sides of the partition, 3, do they not verge on to this rounded lower portion of the partition, 3?

A. Not perceptibly so, to judge from figure 1; at any rate, only a very minute portion of this rounded face is utilized as a fulcrum or rocking bearing, and it is not utilized as a wedge or spreading-bearing.

Q. 295. And if the lower portions of the cutters are in engagement at their inner faces with the partition, 3, and the upper portions of the cutters are in engagement at their outer faces with the inner surface of the bowl, and upward movement or downward movement of the cutters is produced, will not such oscillatory downward

movement of the cutters take place in the O'Donnell & Willard patent reamer?

A. Not necessarily. For example, the parts in position shown in figure 3 in which the shoulders on the cutters bear against a shoe at a point somewhat above the lowermost point of bearing on the partition, any movement of the tool upward from this position will cause the cutters to slide downwardly on the partition without any oscillation such as you refer to until the point of bearing on the shoe has passed below the point of bearing on the partition. After this point is passed there will be an oscillation or rocking motion."

We thus see that the O'Donnell patent and "Defendant's Exhibit O'Donnell and Willard Reamer" are not the same. The patented construction depends upon a locking device to hold the bits in collapsed position. It is conceded that this locking mechanism in this patent is totally inoperative and would not work. Mr. Willard so testifies. This is borne out by the testimony of not only the defendant's witnesses but of complainants' witnesses Arthur P. Knight and Thomas J. Griffin

In this connection it must be borne in mind that the O'Donnell and Willard patent is not a part of the art prior to the Double invention. There is not a scintilla of evidence upon which any finding can be based that Mr. Double had any knowledge of the O'Donnell and Willard experiment or of the application for patent prior to Mr. Double's invention. The patent did not issue until long after Mr. Double's application for patent in suit had been filed; in fact, not until after the patent in suit had issued. Under such circum-

stances the O'Donnell and Willard patent is not and cannot be considered as an anticipation.

Alvord v. Smith & Watson Ironworks, 216 Fed.

150;

Bates v. Coe, 98 U. S. 31;

Diamond Drill Co. v. Kelly Bros., 120 Fed. 282;

Thomson-Houston Co. v. Ohio Brass Co., 130 Fed. 542;

Eck v. Kutz, 132 Fed. 758;

General Electric Co. v. Allis Chalmers Co., 190 Fed. 165, 170;

Sundh Co. v. Interborough Co., ¹⁹⁸~~222~~ Fed. 94, 96 (C. C. A. 2nd);

Johns-Pratt Co. v. E. H. Freeman Co., 201 Fed. 360;

Union Typewriter Co. v. ^{L. C. Smith Bros.}~~E. H. Freeman~~ Co., 173 Fed. 288.

It follows, therefore, that the O'Donnell & Willard defense as asserted in this case must be either the defense of prior public use and subject to the rule in regard to such a defense that a *successful public use* and not a mere abandoned experiment must be proven, and proven beyond reasonable doubt, as said by this court in Parker v. Stebler, 177 Fed. 210, or it must be the defense of prior invention by O'Donnell and Willard, which defense also must be proven by the same quantum of testimony and to make out such latter defense an actual reduction to practice by an operative and successful machine, as tried in actual service, must be shown prior to the date of Mr. Double entering the field, or that at the time Mr. Double conceived

his invention O'Donnell and Willard were diligently reducing their invention to practice. Inasmuch as there is not even a contention that at the time Mr. Double entered the field O'Donnell and Willard were doing anything, this latter qualification of such rule has no bearing. It is, therefore, apparent that the O'Donnell and Willard defense, viewed from any standpoint, must depend entirely upon whether or not it was a successful device and not abandoned because of the disappointment attendant the attempt to use it. Complainants submit that if it was such abandoned experiment then it had no bearing whatever on this case and it falls in the same category as the Jones round-nose reamer and the Brown theory.

Appellant in its opening brief makes another very apparent attempt to misinterpret Judge Cushman's opinion. (Appellant's Brief, p. 56.) This attempt is coupled with the following statement by appellant:

"We confess that we are far from satisfied that *we understand* just what is meant in this involved sentence."

Appellant endeavors to infer that the trial court tried to read the two sets of claims together as a single claim, but this is not what Judge Cushman did, nor what he said. Judge Cushman said that defendant insisted "that, while claims 1 and 2 cover the dovetail arrangement and claims 6, 7 and 8 cover the means securing the tilting action, there is no claim covering both."

Judge Cushman then says that if defendant's assumption were conceded and assumed to be correct,

as long as the lesser combinations were covered by valid claims, no good reason appeared for allowing only a narrow range of equivalents. The “lesser combinations” to which he refers are, of course, the non-inclusion, according to defendant’s contention, in one claim of both the dovetail arrangement and the means for securing the tilting action, but, on the contrary, the covering of these in separate claims. This is clear from the paragraph commencing at the bottom of page 58 of the record, where Judge Cushman says:

“Defendant’s contention in this particular is based on a false premise.”

He is here referring to the contention that “there is no claim covering both.” Judge Cushman then goes on in his opinion to say that claim 1 does cover both of *these* two mechanisms in combination.

Why defendant’s counsel should attempt to pervert the plain meaning of an opinion and in the same breath confess that he is far from satisfied that he understands what is meant, needs explanation from him. The court does not say that it is at liberty to write and grant *new* claims, nor has Judge Cushman in this case in any manner attempted to reconstruct or rewrite the claims of the Double patent.

Complainants’ analyses heretofore appearing in this brief are the same analyses that were submitted to Judge Cushman and adopted by him as the foundation of his opinion.

It is thus seen that again we find that appellant’s criticisms of Judge Cushman’s opinion are far-fetched and strained.

On page 70 of appellant's brief appellant *departs from the record* in this case and asserts to print a table showing the production of petroleum in California. This does not deny any of the facts asserted by complainants. The evidence in this case shows that the Double reamer being, as it was, *the first successful reamer*, played an extremely important part in the development of new oil territory;—that it was one of the great factors in rendering possible the drilling of deep wells. If this alleged table is to be considered by the court, it should also be borne in mind that there is nothing in this table which shows how many drilling operations were carried on during these respective years. Yet it is to be noted that during the years 1902, 1903 and 1904, *while the Double reamer alone held the field*, the production of oil was more than quadrupled and that it has steadily increased ever since.

Many references are made in appellant's brief to the alleged discontinuance of the use of the Double invention. These are strictly misleading. This is shown by the testimony of Thomas J. Griffin [Record p. 100] that he has seen many of the old style Double reamers in the shop of the Union Tool Company;—that they were new reamers manufactured for sale

Mr. Knight in his testimony shows that the Double reamers manufactured by the Union Tool Company all embody the Double invention, even if such invention were given the very limited interpretation contended for by defendant in this case.

Mr. Knight testifies:

“Q. 341. On cross-examination your attention has been directed to certain changes which appear in ‘Complainants’ Exhibit Double Underreamer’ from the device shown and described in the Double patent in suit. What difference, if any, in the mode of operation or the principle of co-operation of the bits and body portion in the collapsing or in the expansion of the bits to and from reaming position, has been effected or made by any difference in construction of such so-called new styled Double underreamer, ‘Complainants’ Exhibit Double Underreamer,’ from the Double patent construction?”

A. These changes in the construction have not made any difference in the mode of operation or principle of action of the parts in collapsing and expanding. The tilt slips working on the downward extension of the body and co-operating with the bearings thereon for expansion and contraction in the same manner and according to the same principles of operation in ‘Complainants’ Exhibit Double Underreamer’ and in ‘Complainants’ Exhibit Double Patent.’”

Appellant could doubtless submit this case with safety without attempting any answer to appellant’s contention that all of the claims of the Double patent were necessarily limited, to the specific details of construction, by the proceedings in the patent office leading up to the grant of the patent in suit. This matter has been exceedingly thoroughly thrashed out by Judge Cushman and an examination of the file-wrapper and contents of the Double application shows that there was no limitation such as would inhibit the application

of the doctrine of equivalence to the claims. It is to be noted in this connection that Judge Cushman has in the companion case (Appeal No. 2918 in this court) applied the doctrine of estoppel by rejections and amendments in the prosecution of an application for a patent and that he had before him all of the authorities upon this question. The rule doubtless may be stated that such estoppel is from maintaining that an amended claim substituted for a rejected and canceled claim covers the devices disclosed in the references cited by the Patent Office Examiner, which the Examiner believed were within the limits of the claim as rejected. That this is the true rule see

National Hollow B. B. Co. v. Interchangeable Co., 106 Fed. 714;

Weber Electric Co. v. Union Electric Co., 226 Fed. 482, 485;

National Gas & Electric Fixture Co. Case, 204 Fed. 79, 83;

Heywood Bros. & Wakefield Co. v. Syracuse Co., 152 Fed. 453;

Drum v. Turner, 219 Fed. 191;

Hess-Bright Co. v. Fitchel, 219 Fed. 723;

J. L. Owens Co. v. Twin City Separator Co., 168 Fed. 259-268;

As said in 168 Fed. ²⁶⁸~~271~~:

“He is not estopped from claiming and securing by an amended claim every improvement and combination he has invented that was not disclosed by the references upon which his original claim was rejected.”

Nor does such estoppel run against the doctrine of equivalency. See 226 Fed. 482, 485; 152 Fed. 453, and 168 Fed. 271-278 above.

This doctrine was applied by this court in *Stebler v. Riverside Heights Orange Growers Association*, 205 Fed. 735, against the contention of defendants that the claims by reason of the rejection of certain claims and substitution of others must be limited to the exact form shown and no application of the doctrine of equivalency applied.

The third Syllobus in 152 Fed. 453 reads:

As said by Judge Ray (152 Fed. 453):

“While it is settled law that a patentee who has acquiesced in the rejection of a broad claim by substituting a narrower one cannot insist upon a construction of the latter to cover that which was rejected, yet such rule does not debar him from a liberal construction of the claim as granted, nor from the benefit of the doctrine of equivalents.”

See particularly pages 462-3 of 152 Fed. Rep.

If the contention of the defendant in this case as to the effect of amendment of claims or the cancellation of too broad claims and the revision of claims could be sustained to the extent of prohibiting the patentee in all cases from claiming any benefit of the doctrine of equivalency, then practically no claim of any patent would be entitled to any application of such doctrine for substantially every claim as first submitted to the patent office is found too broad and must be revised to really bring out the true invention,—the real novelty.

Defendant here has not used either the Brown proposed construction, or the useless O'Donnell & Willard construction or the unsuccessful Jones round nose

reamer construction. Defendant has, however, utilized the Double combinations.

On page 86 of appellant's brief appellant apparently attempts to mislead the court as to the construction of the Wilson reamer. While it is true that the end portion of the Double reamer which forms the lower end of the slot 7 serves as a stop for the downward travel of the spring-actuated rod, key and cutters, so also does the cross piece 11 or bottom bolt of the Wilson reamer.

In this connection complainants desire to call the attention of the court to the fact that the record is replete with testimony that the Wilson reamer without his bottom bolt is unsafe and does not stand up in use. The 6¼" Improved Wilson reamer in evidence is shown to have been used very little, and yet the prongs of the Wilson reamer are shown to have spread outward. This bottom bolt is necessary to strengthen this reamer and keep the prongs from spreading.

The record in this case is replete with instances of the breakage of the prongs of the Wilson reamer and it is definitely proven that one of the purposes, if not the main purpose of this bottom bolt or cross piece 11, is to brace the prongs from spreading apart, thus corresponding in this function to the integral end of the reamer of the Double drawings.

The table printed on page 93 of appellant's opening brief is, of course, an analysis of the Double claims *from the standpoint of the defendant, and based solely upon a narrow and literal interpretation thereof* without regard to the doctrine of mechanical equivalents and without giving any breadth whatever to the Double invention, but limiting such invention as claimed by

the defendant. This table may readily be shown to be inaccurate by reference to the "internal shoulder" which forms the seat for the spring. In this table defendant says that the Wilson reamer does not contain any such internal shoulder. Yet the fact remains that if there was no seat or shoulder the spring, spring-actuated rod and the cutters or bits would all fall out of the reamer. The removable block 7 (or the key in the Wilson Improved reamer) is the full equivalent of this, as we have heretofore pointed out.

This table of analysis admits that the Wilson reamer body is hollow. It denies that it is *slotted*, and yet there is an open slot extending clear through it. This open slot forms the slipways in which the shanks of the cutters move up and down in expansion and contraction and through which they extend so that the shoe of the casing may contact high on the cutter shanks. It is nonsense to say that the body or mandrel of the Wilson reamer is not slotted. This analysis also is shown to be made up upon the hypothesis of limitation of the Double claims to their exact form and construction of elements, by the denial that the Wilson reamer contains dovetails on the mandrel. The table on page 93 says "dovetails sloping upwardly and inwardly." We thus see that it is only on the basis of limitation to the exact details and to the precise words that appellant has composed this table. Take another example, under the heading "slips." It is denied that in the Wilson devices there are any "inward projections." Clearly the surfaces 16 of the Wilson cutters are projected inward toward the center of the body when the cutters are in place in the reamer.

We have already shown sufficient to show that reliance cannot be placed upon this table. There are many other criticisms which might be made of it.

The references in appellant's brief to non-infringement because of the omission of elements is *dehors* the case. No elements have been admitted. Either the exact elements have been used or in each case the full mechanical equivalent of the element.

On pages 102 and 103 of appellant's brief appellant seeks again to twist the record. The testimony there referred to of Mr. Double is in explanation of the reason why Mr. Double did not show in his first application for patent the particular construction of underreamer shown in the Double patent 796,197 (the application which was in interference with Edward L. Mills).

As demonstrated in the record, the Mills interference involved in particular a removable end block, a specific feature of construction which was not shown in the Double patent in suit and which was not in fact used in any of the Double reamers except the first Double reamer built in June and July, 1901.

When the National Supply Company, of Los Angeles, California, commenced to put out a reamer with such a removable end block under an application for patent filed by Edward L. Mills, the present counsel for complainants suggested the filing of the additional application to cover the removable end block features. This is usual in patent soliciting. One patent may cover the broad invention, while additional patents are required to cover the different species or forms.

Inasmuch, therefore, as the specific claim of the Mills application limited to the removable end block could not be made in the application for the patent here in suit, when contesting Edward L. Mills' right to a patent upon such removable end block construction, it was necessary for Mr. Double to file an additional application. This had nothing to do with any limitation of the claims of Mr. Double's first application. On the contrary it had to do with Mr. Double making a specific claim for a specific construction,—the removable end block construction.

The importance of the Double invention,—the place which it immediately took in the art entitles it to liberal treatment at the hands of the court that the real purpose of the patent laws may be subserved. Whether it was a "pioneer" or "primary" invention need not be decided. It was certainly one of great importance to the well drilling art. Under the well settled rules of construction the claims of this Double patent will be given such an interpretation by this court as to cover and embrace the novelty of the invention, and when so construed infringement cannot be in doubt.

The following extracts from the recent decisions will illustrate the trend of modern authority to protect patentees in accordance with the novelty of their inventions.

In *Brown Bag-Filling Mach. Co. v. Drohen* (140 Fed. 97, 100) it is said:

"The Cummings patent in suit, in my opinion, is for a new machine or combination which produces a new and useful result, entitling the pat-

entee to invoke the doctrine of equivalents. The claims secured by the patentee are such that in the determination of the question of infringement by defendant's apparatus the forms and dissimilarities of construction are not controlling. As stated in *Kinloch Tel. Co. v. Western Electric Co.*, 113 Fed. 652, 5 C. C. A. 362:

“The similarities and differences of machines and combinations are to be determined by the offices or functions which they perform, by the principles on which they are constructed, and by the modes which are used in their operation. A device which is constructed on the same principle, which has the same mode of operation, and which accomplished the same result as another by the same or by equivalent mechanical means, is the same device, and a claim in a patent of one such device claims and secures the other.’ Citing *Machine Co. v. Murphy*, 97 U. S. 120, 125, 24 L. Ed. 935.”

As said by the Supreme Court in *Keystone Mfg. Co. v. Adams* (151 U. S. 139):

“But when in a class of machines so widely used as those in question, it is made to appear that at last, after repeated and futile attempts, a machine has been contrived which accomplishes the result desired, and when the patent office has granted a patent to the successful inventor, the court should not be ready to adopt a narrow or astute construction, fatal to the grant.”

In *Bucher & Gibbs Co. v. International Harvester Co.*, 211 Fed. 475, it is said:

“The structure of the defendant is practically a copy of the structure made by complainant, with

the exception that the anti-tilting devices are different in form and the manner of location, but perform substantially the same functions.

“The record discloses that the defendant knew of the Niesz patent at the time it was developing its harrow, and that the structure developed by the defendant was considered by the patent department of the defendant company, as whether or not it was within the scope of the original Niesz patent. It is also plain that the defendant’s structure contains all the elements of the claim of the original Niesz patent.”

The court there refers to the interpretation of the patent to be viewed in the light of the fact that the defendant has before it the patent in suit.

Where did Mr. Wilson get his idea of the open slipways, the shanks of the cutters slipping in those open slipways, the interrelated dovetails on the slipways, and shanks of the cutters; the spreading-bearings; the interrelation of the spreading-bearings and the inclination of the dovetails; the open sockets of the slips being somewhat larger than the head of the key to permit of the tilting action; all of those features in combination taken from somewhere; not existing in any prior device in those combinations; and yet where did he get that combination, which he has? It is perfectly apparent. He had before him the Double underreamer and the Double patent. Now, we know where he got it; we do not have to surmise; we do not have to say that he went and picked it out piecemeal from the Leidecker, the Swan, the Canadian, the Jones, the North, the Mentry or any of the others;—he did not

have to go to the disassociated elements; he had before him the combination just as he used it.

Referring again to this Kings County case in 182 Fed., at page 59, this court there says:

“It does not necessarily follow, from the fact that the claim describes a specific form of construction, that the inventor shall be limited to that form.”

As said by the Supreme Court of the United States in the case of *Winans v. Denmead*, 56 U. S. 340:

“It is generally true, when a patentee describes a machine and then claims it as described, that he is understood to intend to claim and does by law actually cover, not only the precise forms he had described, but all other forms which embody his invention; it being a familiar rule that, to copy the principle or mode of operation described, is an infringement, although such copy should be totally unlike the original in form or proportions.”

“And, therefore, the patentee, having described his invention and shown its principles and claimed it in that form which most perfectly embodies it, is in contemplation of law deemed to claim every form in which his invention may be copied. * * *”

This court in the case of *Los Angeles Art Organ Co. v. Aeolian Co.*, 143 Fed. 887, said:

“In passing upon the issue of infringement, the question to be determined is whether, under a variation of form or by the use of a thing which bears a different name, the defendant accomplished by his machine the same purpose or effect as that accomplished by the patentee, or whether there is

a real change of structure or purpose. If the change introduced by the defendant constitutes a mechanical equivalent in reference to the means used by the patentee, and if besides being an equivalent it accomplishes something useful beyond the effect or purpose accomplished by the patentee, it will still be an infringement as respects what is covered by the patent, although the further advantage may be a patentable subject as an improvement on the former invention." Citing the *Blandy v. Griffith* case, as follows:

"‘As long as the root of the original conception remains in its completeness, the outgrowth—whatever shape it may take—belongs to him with whom the conception originated.’”

In *Walker on Patents*, Sec. 376, the author said:

“On the other hand, defendant’s machine may be better than that covered by the patent in suit; but if that superiority resulted from some addition to the latter, it will have no tendency to avoid infringement.”

Quoting further from *Robinson on Patents*, Sec. 30:

“To the patentee belongs not merely the exclusive right to what he has invented, but also the right to prevent others from using their own inventions, however valuable they may be, if they embrace a single one of his original ideas.”

This quotation from *Curtis on Patents*, Sec. 320:

“The substantial identity, therefore, that is to be looked to, in cases of this kind, respects that which constitutes the essence of the invention, viz., the application of the principle. If the mode of carrying the same principle into effect adopted by

the defendant still shows only that the principle admits of the same application, in a variety of forms, or by a variety of apparatus, the jury will be authorized to treat such mode as a piracy of the original invention.”

A more recent case by this Court of Appeals is the case of *Detroit Copper Mining Co. v. Mine & Smelter Co.*, 215 Fed. 103, in which the court says:

“When the whole *substance* of the invention may be copied in a *different form*, it is the duty of courts and juries to look through the *form* for the *substance* of the invention.

Winans v. Denmead, 15 Howard 330;

Metallic Extraction Co. v. Brown, 104 Fed. 345,
43 C. C. A. 568;

Benbow-Brammer Mfg. Co. v. Simpson Mfg. Co. (C. C.), 132 Fed. 614.

“The riffles in the Deister table, used by the appellants, differ from those of the Wilfley table in that each alternate riffle terminates with minute and slightly deflected ends, which have an elevation of but one thirty-second of an inch, so that at the conclusion of the separation the material is discharged into the open spaces between them. If the deflected ends were removed, there would remain a table having riffles with advancing terminals, as in the Wilfley table. We are of the opinion that the use of these deflected terminals so greatly reduced in elevation does not serve to differentiate the Deister table from that of the patent in suit, whether the spaces covered by them be regarded as substantially a smooth surface, as was held in *Wilfley v. Denver Engineering Works*

Co. *et al.* (C. C.), 111 Fed. 760, and in *Mine & Smelters Supply Co. v. Braeckel Concentrator Co.* (D. C.), 107 Fed. 897, or whether they be regarded as a continuation of the riffles. There is presented in either view a table with riffles terminating in a diagonal course with reference to their general direction, a course which is essential to the successful operation of either table, and *thereby the appellants have availed themselves of the distinctive feature of the Wilfley table*, and therewith they have performed the same function by the same means, and in substantially the same manner, as in the Wilfley combination.”

The Circuit Court of Appeals of the Eighth Circuit, in *Lewis Blind Switch Co. v. Premium Mfg. Co.*, 163 Fed. 951, says:

“A patent for an invention which is neither primary nor a slight improvement on the prior art, but possesses substantial patentable novelty, covers a reasonable range of equivalents.

“In interpreting the claims of a patent, proper regard should be had to the natural import of the terms in question, the context and the specification.”

In the *Paper Page* case, 210 U. S. 405, the defendant and appellant contended that the patent in suit not being a “pioneer” or “primary” patent, was not infringed, claiming:

“Identity of means and of operation are necessary to constitute infringement of a secondary patent.”

This the Supreme Court refused to uphold, finding the patent infringed, and saying:

“The two questions, therefore, which remain for decision are the jurisdiction of the court and the question of infringement. We will consider the latter question first.

“It does not depend, counsel for the Continental Company says, ‘upon any issue of fact, but does depend, as questions of infringement’ sometimes do, upon a ‘point of law.’ This point of law, it is further said, has been formulated in a decision of this court as follows: ‘Where the patent does not embody a primary invention, but only an improvement on the prior art, and defendant’s machines can be differentiated, the charge of infringement is not sustained.’ Counsel for respondent do not contend that the Liddell invention is primary within the definition given of that term by petitioner. Their concession is that it is ‘not basic, in the sense of covering the first machine ever produced to make self-opening square bags by machinery.’ They do not contend, however, that it is one of high rank, and if it be given a ‘fair construction and scope, no matter whether we call it basic, primary, or broad, or even merely entitled to be construed, as covering obvious mechanical equivalents, the question of infringement of the claims in suit by petitioner’s machine becomes mechanically, and from a patent law standpoint, a simple one, in spite of slight differences of operation and of reversal of some of the moving parts.’ The lower courts did not designate the invention as either primary or secondary. They did, however, as we shall presently see, decide that it was one of high rank and entitled to a broad range of equivalents. It becomes necessary, therefore, to consider the point of law upon which petitioner contends the question of infringement depends.”

“The citation is from *Cimiotti Unhairing Co. v. American Fur. Ref. Co.*, 198 U. S. 399, 49 L. Ed. 1100, 25 Sup. Ct. Rep. 697, and *Kokomo Fence Mach. Co. v. Kitselman*, 189 U. S. 8,—”

And I will pause there to say that those are two of the decisions to which reference has been made by the respondent here in oral argument; the Supreme Court saying these two decisions were adduced to sustain the proposition. Reading further:

“But the whole opinion must be considered, and it will be seen from the language which we shall presently quote that it was not intended to say that the doctrine of equivalents applied only to primary patents.

“We do not think it necessary to follow counsel for petitioner in his review of other cases which, he urges, sustain his contention. The right view is expressed in *Miller v. Eagle Mfg. Co.*, 151 U. S. 186, 207, 38 L. Ed. 121, 130, 14 Sup. Ct. Rep. 310, as follows: ‘The range of equivalents depends upon the extent and nature of the invention. If the invention is broad or primary in its character the range of equivalents will be correspondingly broad, under the liberal construction which the courts give to such inventions.’ And this was what was decided in *Kokomo Fence Mach. Co. v. Kitselman*, *Cimiotti Unhairing Co. v. American Fur. Ref. Co.*, and *Computing Scale Co. v. Automatic Scale Co.*, 204 U. S. 609, 51 L. Ed. 645, 27 Sup. Ct. Rep. 307. It is from the second of those cases, as we have seen, that the citation is made which petitioner contends the point of law upon which infringement depends is formulated; but it was said in that case: ‘It is well settled that

a greater degree of liberality and a wider range of equivalents are permitted where the patent is of a pioneer character than when the invention is simply an improvement, maybe the last and successful step, in the art theretofore partially developed by other inventors in the same field.'

"It is manifest, therefore, that it was not meant to decide that only pioneer patents are entitled to invoke the doctrine of equivalents, but that it was decided that the range of equivalents depends upon and varies with the degree of invention. See *Ives v. Hamilton*, 92 U. S. 426, 23 L. Ed. 494; *Hoyt v. Horne*, 145 U. S. 302, 36 L. Ed. 713, 12 Sup. Ct. Rep. 922; *Deering v. Winona Harvester Wks.*, 155 U. S. 286, 39 L. Ed. 153, 15 Sup. Ct. Rep. 118; *Walker, Patents*, Sec. 362; *Robinson, Patents*, Sec. 258."

The Supreme Court has repeatedly held that a charge of infringement may be made out though the letter of the claims is avoided:

Machine Co. v. Murphy, 97 U. S. 120;
Ives v. Hamilton, 92 U. S. 426-431;
Morey v. Lockwood, 8 Wall. 230;
Elizabeth v. Pavement Co., 97 U. S. 126, 137;
Sessions v. Romadka, 145 U. S. 29;
Hoyt v. Horne, 145 U. S. 302.

This court has repeatedly held that without being a truly "pioneer" or "primary" invention the inventor may be entitled to a liberal application of the doctrine of equivalency.

Parker v. Stebler, 177 Fed. 210;
Stebler v. Riverside Hts. Assn., 205 Fed. 735.

“One who appropriates another’s patented invention, even though he may add thereto another element to perform an additional function, is guilty of infringement.”

Stebler v. Riverside Assn., 205 Fed. 735.

The fact that the Wilson reamer may be an improvement of the reamer shown in the patent in suit does not prove non-infringement; neither does the fact that a patent has been granted for such improvement. It may as well be infringement plus improvement. See cases cited by this court in 205 Fed. 735, *supra*.

A great deal of effort has been expended by appellant in attempting to impress this court with the greatness, merit or importance of the “Wilson invention.” Every time that appellant refers to the Wilson invention it is to be noted that it totally *ignores the fact* that a reamer embodying such alleged invention cannot exist without the Double invention. The alleged Wilson invention is nothing but a mere improvement on the Double reamer. This is recognized by Mr. Wilson’s own testimony. How important is immaterial *in this case* how much of an improvement. It was Mr. Wilson’s original purpose to improve upon the Double reamer. See his testimony commencing at the middle of page 140 of the record. If, as appellant asserts, the Wilson invention was of such great importance, how much greater must have been the Double invention which is at the very foundation of and an absolute requisite to any reamer embodying the Wilson improvement?

In appellant’s brief many references are made to the

suit decided by this court entitled *Wilson & Willard Mfg. Co. v. Bole*, and it is asserted on page 120 of appellant's brief that "a patent has since issued to Wilson for the key combination, and a suit under same against appellee is now pending." Appellant is again arguing and asserting matters outside the record, matters which have no bearing upon the question of whether the Double patent is valid or the claims infringed. If appellant's statement is true, the courts will adjudicate such alleged suit. The issue in this case is not whether such alleged "key" invention was novel or patentable or had not been in use for more than two years prior to Wilson's application for that patent. The issue here is the Double invention and the infringement thereof.

It seems to please appellant to refer to the Double invention as abandoned and as the "obsolete Double device." But the facts of the case show that neither the Union Tool Company nor the Wilson & Willard Manufacturing Company has ever abandoned the use of the Double invention or that the same has ever become obsolete. The facts of the case show that the Double invention is the very foundation upon which the superstructure of modern underreaming is built and was in fact an epoch making invention and is entitled to be liberally dealt with by this court.

Complainants submit that the decree appealed from was correct and should be affirmed.

Complainants submit further that the correct view of the O'Donnell and Willard unsuccessful and abandoned experiment, the Jones round nose failure, and

the Brown theory and failure, is that neither of these is a part of the prior art and should be simply set aside and given no weight whatever herein; that they are not limitations in any manner of the Double invention and that in fact Judge Cushman has erred *against complainants* in giving them any consideration whatever except to hold that each of them was unsuccessful, a disappointment to the parties interested, and a mere unsuccessful attempt to produce something useful.

As said by the Supreme Court of the United States in *Whiteley v. Swayne*, 74 U. S. 685:

“He is the first inventor and entitled to the patent, who being an original discoverer, has *first perfected* and adapted the invention to actual use.”

In *Agawam Company v. Jordan*, 7 Wall. 583, 602, 19 L. Ed. 177, the Supreme Court said:

“The settled rule of law is that whoever *first* perfects a machine is entitled to the patent and is the real inventor, although others may have previously had the idea and made some experiments towards putting it in practice. He is the inventor and entitled to the patent who first brought the machine to perfection and made it capable of useful operation.”

As said in *Hopkins on Patents*, Sec. 211, page 263:

“Rule XXIX. THAT THE ALLEGED ANTICIPATORY MATTER HAS NEVER GONE INTO PRACTICAL USE MAY BE CONSIDERED IN DETERMINING THE QUESTION OF ANTICIPATION.

Thus, Judge Putnam has said: ‘Anticipatory matter which has never gone into practical use is to be narrowly construed.’ *Simonds Rolling Mach. Co. v. Hathorn Mfg. Co.*, 90 Fed. Rep. 201, 208, and Judge Buffington has said: ‘In determining a question of this character it is a pertinent and

reasonable inquiry, if it be true that the disclosure of an earlier patent was substantially that of Jones, why during a period of many years, was it not practically applied to the same use?' *Carnegie Steel Co. v. Cambria Iron Co.*, 89 Fed. Rep. 721, 738; citing *Regulator Co. v. Copeland*, 2 Fisher 221, Fed. Cas. No. 2866. Judge Colt has said: 'If the question of identity of method and result is doubtful, *the doubt must be resolved in favor of the successful patentee, who has in a practical way materially advanced the art.*' *Simonds Rolling Mach. Co. v. Hathorn Mfg. Co.*, 93 Fed. Rep. 958, 961; citing *Washburn v. Gould*, 3 Story 122, 144 Fed. Case No. 17,214."

The mere fact that a patent issued to O'Donnell and Willard or to Jacob S. Brown, does not materially change the case.

The record in this case shows that neither the O'Donnell and Willard patent or the Brown patent was sufficient to enable one skilled in the art to make and use a successful underreamer.

In *Kings County Raisin & Fruit Co. v. U. S. Consolidated S. R. Co.*, 182 Fed. 159, this court said of the Crosby patent and the alleged invention therein described:

"It would seem that it was one of those unsuccessful or abandoned inventions which are held to have no place in the art to which they relate."

"In any view, Pettit being the first successful machine to accomplish a new result, the claims of the patent are clearly entitled to a broad and liberal construction and to the doctrine of equivalents."

Respectfully submitted,

FREDERICK S. LYON,

Solicitor for Complainants and Appellees.

United States
Circuit Court of Appeals,
FOR THE NINTH CIRCUIT.

Wilson & Willard Manufac-
turing Company,

Appellant,

vs.

Union Tool Company, et al.,

Appellees.

Filed

APPELLANT'S REPLY BRIEF.

JUN 27 1917

F. D. Monckton

Clerk.

RAYMOND IVES BLAKESLEE,
Solicitor and Counsel for Appellant.

INDEX.

	PAGE
Appellants' Reply Brief.....	3
Supplement Dealing with Misrepresentations, Un- truths and Distortions in Appellees' Brief.....	109

No. 2996.

United States
Circuit Court of Appeals,
FOR THE NINTH CIRCUIT.

Wilson & Willard Manufac-
turing Company,

Appellant,

vs.

Union Tool Company, et al.,

Appellees.

APPELLANT'S REPLY BRIEF.

Pursuant to permission granted appellant on the argument of this case, and to order made subsequently extending the time during which this brief might be filed, appellant presents this, its reply brief, and takes liberty again to call the court's attention to the fact that appellant's opening brief was by force of circumstances prepared and filed prior to the completion of printing of the record or of the paper exhibits, rendering it necessary to somewhat more elaborately reply than the brief of appellees on its face would seem to make it necessary.

Just as we had surmised, counsel for appellees has found it utterly impossible to make a logical or sound reply to any one of the several main points upon which our defense is based as set forth in our opening brief. In fact two or three of the most vitally important points urged by us in our opening brief remain entirely unanswered and not even mentioned by counsel for appellee in his reply brief. The inference is, of course, clear that he had no answer to offer to those points, and that to attempt to do so would only emphasize the weakness of his case. A few of the other points he has endeavored to answer by misstatement of facts, fallacious statements of the law, and absurdly distorted applications of the rule of the Doctrine of Equivalents, or by relying upon the bias and prejudiced testimony of their so-called expert witnesses Griffin and Knight. Counsel for appellees has evidently even regarded such means as insufficient for we find him resorting to what we might term examples of clumsy legerdemain whereby he evidently endeavors to so deceive the eyes of this court as to cause Your Honors to believe that the reamers he describes have entirely different form and different principles of action and modes of operation from those which are clearly disclosed by even a casual observation of the devices themselves. Again, in reply to other of our points he merely makes a few totally misleading statements and then immediately bends every effort to divert the attention of the court to something entirely foreign to the point in question.

In short counsel, having found it folly to rely on the facts according to the testimony and evidence in this

case, and upon the law involved, has sought the means mentioned above in the desperate hope that he may avoid a reversal of the decree of the lower court.

We are entirely convinced that counsel for appellees will find it utterly impossible to deceive this court, and that his bold efforts to do so can do nothing other than reveal the insupportability of his cause. His case is unsound and no doubt had it been tried before a court experienced in patent law and patent matters (we believe this was the first case involving patent law ever heard by Judge Cushman) it would certainly have been dismissed. At this point we wish to state that we have the fullest appreciation of Judge Cushman's care and painstaking efforts to do justice in these two interrelated causes.

By our opening brief and on argument we pointed out to Your Honors that the Double Underreamer Patent #734,833, namely, the patent in suit, had been fraudulently obtained by Mr. Double; that Frederick W. Jones, an inventor of some considerable ability, was at least a co-inventor of the Double underreamer in suit; that at that time he had made no claim for any interest therein, believing that the inventions of an employee belonged to the employer.

We also argued that the principal elements and combination found by Judge Cushman to be the chief and novel features of the Double invention, instead of being the invention of Double, as he stated in the decree, were in reality the invention of prior inventors, namely, Brown, Jones, O'Donnell & Willard, Swan, and others; *we also argued that the Double underreamer covered by the patent in suit was merely a transitory step in the*

art, a highly unsatisfactory device at best and was soon abandoned upon the advent of appellant's underreamer, in 1905. That it never did take the field to the exclusion of other underreamers, such as the Austrian underreamer, the Swan underreamer, Plotts underreamer, etc.

We also argued that in view of the prior art, which had been thoroughly misunderstood by Judge Cushman, and in view of the abandonment of the Double underreamer and its failure to supersede other reamers, and further, in view of the fact that instead of enabling deeper drilling *it simply followed in the wake of deeper drilling* occasioned by the greater demand for oil, the use of the calf wheel, heavier casing and wire lines; and that accordingly it was not entitled to the benefit of being a pioneer invention and not entitled to a broad application of the rule of the Doctrine of Equivalents.

We also added that the Double patent was a narrow combination patent containing nothing but very limited claims, combinations of admittedly old elements.

We argued also that the Double patent covered the particular combination of elements disclosed by the Double patent and nothing more, and that even by the allowance of a liberal application of the Doctrine of Equivalents the Wilson underreamer could not be held to infringe the Double patent for the reason *that it is constructed upon entirely different principles*, combining new and novel elements, and is an entirely different organization of elements and is based upon different principles of action and has different modes of operation.

We argued also that the Wilson underreamer was

the first “completely” successful underreamer ever manufactured; and that the Wilson patented lug construction, the Wilson shanked cutters with retaining shoulders on such shanks to coact with retaining means on the body, also having broad cutter-head, such construction enabling the use of stronger cutters, greater expansion and greater collapsion of cutters, assembling at the bottom, and remachining of reamer body, were new in the art and are the *novel principles upon which all successful underreamers must be founded.*

We also pointed out that the Wilson underreamer was promptly recognized as the only completely successful underreamer on the market; THAT IT IMMEDIATELY SUPERSEDED THE DOUBLE UNDERREAMER; THAT THE DOUBLE UNDERREAMER WAS PROMPTLY ABANDONED AND THAT APPELLEES FROM THAT TIME ON CEASED TO MANUFACTURE THE DOUBLE UNDERREAMERS AND IN ITS STEAD MANUFACTURED UNDERREAMERS WHICH JUDGE CUSHMAN HAS FOUND TO BE INFRINGEMENTS OF THE WILSON PATENT. Strangely enough Judge Cushman still designates these infringing reamers as “Double Underreamers,” and by giving them the credit for having taken the field, gives Double the credit for having invented the reamers “which constituted combinations of decided merit, entitling complainants to a fair range of equivalents,” and that “eighty-five per cent of the underreamers sold are either of the Double type or that of the alleged infringing device.” *In short he gives those underreamers credit for still being the Double underreamer and at the same time proclaims*

them to be infringements of the Wilson underreamer patent!

Was ever such a peculiar and weird fallacy brought to the attention of this Honorable Court? Clearly the lower court erred in giving Double the credit for being the inventor of those underreamers or for holding that they were the underreamers disclosed by the Double patent.

JONES AT LEAST A CO-INVENTOR OF THE DOUBLE
REAMER IN SUIT.

In counsel's reply brief counsel has again found it necessary to deny that Jones had anything to do with or contributed anything to the so-called Double invention. In view of the extreme importance of this point of our defense, we wish to take the liberty of considering that point even more fully than we have done in our opening brief. We are convinced that we can prove to the entire satisfaction of Your Honors that Judge Cushman, when declaring that certain testimony of Frederick W. Jones, while a witness in a prior case (which testimony was read in open court by counsel for appellees, entirely discredited the testimony of Mr. Jones given in open court in this case, was entirely mistaken as to that testimony, *and we will further show that that particular testimony was in exact accord with the testimony of Mr. Jones given in this case.*

That the error of Judge Cushman was due to a misconception of a certain incident referred to in that testimony, having it confused with another incident referred to by Mr. Jones when testifying in open court, is obvious. Had he realized that the testimony quoted

had reference to an entirely different incident, the situation would have appeared altogether different to him and he certainly could not have held Jones' testimony in this case to have been discredited by the quoted testimony.

With the exception of the quoted testimony from the prior suit, *plaintiff relies entirely upon the testimony of Double himself and four of his long trusted employees* to establish that Double and not Jones was the inventor of the Double reamer in suit. IS IT NOT NOTABLE THAT NOT ONE SYLLABLE OF EVIDENCE FROM ANY DISINTERESTED WITNESS DO THEY INTRODUCE ON THIS IMPORTANT POINT? The inference is that any evidence on the matter procurable from disinterested parties would establish Jones and not Double to be the inventor of the underreamer in suit.

The witnesses John A. Richardson and William G. Naugle, who testified in our behalf on that matter, are the only parties who were employed in the Union Oil Tool Company's shop under Mr. Double at the time that underreamer was invented AND WHO CAN BE SAID TO BE ENTIRELY DISINTERESTED WITNESSES.

Richardson testifies unqualifiedly that he saw Jones making the drawings for that reamer in the office of the shop—Double's office.

Double testified in reference to the conception of the first so-called Double reamer, viz, patent #796,197, T. of R. page 955:

Q. 3. "I show you Complainant's Exhibit Double Patent No. 796,197. You are the Edward Double named therein, are you?"

A. Yes.

Q. 4. Do you know who first conceived the construction of an underreamer as therein set forth and described?

A. I did."

Also see statement in ans. to Q. 5, page 956:

"I made all the sketches and all the drawings or so-called drawings there were to manufacture the reamer."

Also page 957: "Jones did no work on that reamer to the best of my knowledge."

Again T. of R. page 959:

"I received no suggestions from Fred W. Jones concerning design of underreamers, 'Complainant's Exhibit Double Patent No. 796,197' or 'Complainant's Exhibit Double Patent,' being the patent in suit #734,833."

The four employees, viz, Dinger, Buffington, Terri-berry and Youngken, all echo Double's contention that Double was the sole inventor of these reamers and that Jones had nothing to do with them and did not work on them in the shop.

Note how completely they are refuted by Richardson and Naugle, BOTH OF WHOM WERE EMPLOYED IN THAT SHOP AT THAT TIME, BUT WHO, UNLIKE THE WITNESSES JUST MENTIONED, ARE IN NO WISE ASSOCIATED WITH EITHER DOUBLE, JONES OR WILSON, AND ARE WELL RESPECTED CITIZENS ENGAGED IN BUSINESS IN SANTA PAULA. THEIR WORD MUST BE FAR MORE CONVINCING THAN THAT OF DOUBLE AND HIS FAITHFUL EMPLOYEES.

See testimony of Richardson, T. of R., page 949:

“Am acquainted with Frederick W. Jones, having known him since my arrival in California. He was a machinist in the Union Oil Tool Company’s shop at the time I went there. I worked in the blacksmith shop as a blacksmith. * * * Probably a dozen or so of those reamers (Double) were made while I was in the shop. I worked on all of them. On new work I used to get what we called a ‘working draft’ and worked to that. By draft I mean drawing. I don’t know who had to see the drawings—I used to see Mr. Jones making the drawings. He made the drawings in the office—that is in the office of the shop—Mr. Double’s. * * * I don’t remember of receiving any instructions from Mr. Double in regard to that underreamer. I did not see any reamers of that type made in the Union Oil Tool Company’s shop prior to the time I saw Mr. Jones making the drawings.”

See also T. of R., page 951:

“I have talked and discussed the underreamer with Mr. Jones. It was the drawings I saw Mr. Jones making in Double’s office which I used as a guide in making the parts of the Double underreamer.”

See also T. of R., page 952:

“I don’t know that I ever saw Edward Double making any drawings in that shop. I do not know that he could make drawings.”

Naugle testified as follows, see T. of R., page 937:

“I know he (Jones) worked on the Double reamer. It was a new underreamer.” * * *

“What I remember about it was this: * * * And I remember the underreamer hanging in the shop and Jones was working on it and went back and forth through the shop to get different things for it.”

Also on T. of R., page 938:

“I remember that they were first working on an underreamer, and they took it out to the oil field, and, if my memory is right, it lost the jaws of it off, or something like that, and it was brought back and they changed the pattern or style of the reamer. * * * I do not know that the same reamer was changed after the jaws were broken in it but there was a change from that reamer to one having dovetails in it. I won't say that it was the same reamer. From what I know about forgings, I would not think the same reamer could be changed. It is my recollection that Mr. Jones was still employed by the Union Oil Tool Company when this reamer was brought with the jaws lost. * * *

R. D. Q. 52. (By Mr. Blakeslee): “Have you any recollection as to who worked on the reamer in the changed or modified form or the reamer of modified form, including the dovetails, after the trial of the first reamer that Jones worked on?”

A. According to my recollection it was at the time Jones worked on it. While I may be wrong, it is in my mind that he worked on this second reamer and I remember his general talk was—

Mr. Lyon: Wait a moment. We object to the general talk as hearsay.

The Court: Sustained.

R. D. Q. 53. By Mr. Blakeslee: Is that your best recollection?

A. That is my recollection—that Jones worked on the reamer when it came back.”

Now Your Honors, we contend that this testimony is convincing and should be given much greater weight than that of Double and his employees. There is much in their testimony in the way of collateral statements, circumstances, etc., which gives it the character of truthful, unbiased testimony, something wholly lacking in the testimony of Double and his four employees.

The testimony of Mrs. Olive E. Jones is very convincing and completely supports Richardson in regard to the drawings being made by Jones, and as to the failure of the first reamer and the change made, all as testified to by Naugle.

See T. of R., page 940:

“When the first reamer went out it failed to be a success on account of not being enough stock, as he (Jones) said, in the cutters, and he was going to change and make dovetails in the cutters and also in the body. That discussion I had with him previous to the time I saw him working on the drawings in the office of the Union Oil Tool Company. He talked at home stating that there would have to be a change made in some way to give more stock to the cutters, as there was where the underreamer was weak. As I stated before that was prior to the time I saw him working on the drawings in the office. * * * The drawing he was working on was like those shown by Complainant’s Exhibit Double Reamer Patent.”

Note how this testimony fits in with that of Richardson and Naugle. Nothing could be more convincing.

So afraid has counsel been in regard to this contention of Jones as to being at least a co-inventor with Double of the so-called Double reamers that he endeavored to prove that Jones was not working in that shop at all at the time of the conception of them,—that he was working in the Skinner shop, but in Double's employ.

Now, if the testimony of Richardson, Naugle and Mr. Jones and Mrs. Jones be not entirely sufficient to completely disprove that contention and to brand it as either a falsehood or a failure of memory, the following will certainly do so.

Skinner states [see T. of R. page 1001], that his relations with the Union Oil Tool Company ceased the first month after he installed a Flather lathe;—that he and Double ceased to be friends at that time; that nobody from the Union Oil Tool Company's shop worked in his shop after that.

Now please note the testimony of J. B. Shaw and James A. Haskett [T. of R. pages 1007-1008-1009], that that lathe was shipped by the Flather people on February 7, 1901, and that it was shipped March 20, or 23, 1901, from Los Angeles to Santa Paula; that there was no congestion of freight at that time,—no delay from Los Angeles to Santa Paula. Therefore, that lathe reached Skinner at Santa Paula in March, 1901. He no doubt installed it before the month was closed. Hence, having ended his relations with the Union Oil Tool Company in the following month after installing the lathe, would PLACE THAT EVENT IN APRIL.

Even assuming that it was May at the very outside, THAT WOULD BE ONE MONTH BEFORE THE CONCEPTION OF THE FIRST SO-CALLED DOUBLE REAMER AND TWO MONTHS BEFORE THE CONCEPTION OF THE REAMER IN SUIT PATENT #734,833.

Thus we see that Jones, being in the employ of the Union Oil Tool Company until July 15, 1901, as Double admits, he could have been working nowhere else than in the Union Oil Tool Company's shop and not in the Skinner shop, as Double and his four employees testified.

This absolutely conclusive evidence shows beyond the shadow of a doubt, *that the testimony of Double and his four employees is wholly unreliable and should be disregarded in every particular.*

Now, it is to be noted that the lower court set aside this highly important feature of the defense—disregarded all the evidence and testimony tending to prove Jones to be a co-inventor, if not the sole inventor, of the so-called Double underreamers, solely upon his erroneous conception of the substance of the testimony of Jones as a witness on behalf of E. Mills in August, 1903, in a case involving an interference action concerning the applications for patents by E. Mills and Edward Double covering underreamers.

It is to be noted that at the time of giving that testimony, Jones was of the opinion that whatever he had invented in underreamers while employed by Double, belonged to Double, nor did he know to the contrary until so appraised by E. C. Wilson in 1915. This will account for him referring to the so-called Double reamer as "The reamer that Double made." He sup-

posed it was Double's reamer even though he (Jones) had had much to do with designing it.

The court, referring to that testimony, strangely enough, seemed to see something in it which entirely negatived everything offered in that regard in this case.

The testimony referred to in part is as follows:

See extract from memorandum decision, T. of R., page 47:

"Q. Did you have a conversation with Mr. Double in regard to this reamer (796,197); and if so state the conversation?

A. 'Well, I was employed by Mr. Double at the same time he was manufacturing the reamer in question; I had a conversation with him and he said the reamer was a mean thing to manufacture and that he would change the construction of it, and he showed me what changes he proposed to make, and he also asked me what I thought of the changes, and I told him that I thought the change was a good one. That is all."

The court says of this testimony, T. of R., page 48:

"This so far discredits the testimony of Jones as to leave no warrant for overthrowing the presumption of regularity in the issuance of the patent, as well as plaintiff's evidence now given in support of the patent."

We have given this quoted Jones testimony very careful study and are unable to find any statement or expression therein which can be regarded as seriously inconsistent with the testimony given by Mr. Jones in the present suit. Certainly there is nothing therein so

damning and so completely fatal when compared with his testimony in this case as to render completely negatory all of his testimony in this case as well as that of disinterested witnesses who corroborate his testimony so completely.

Either the court has confused this conversation with an incident which took place between Mr. Jones and Mr. Double at the time they were first inspecting the *Brown model* of an underreamer, which underreamer model had been brought to Santa Paula by Mr. Gilson, and which conversation is included in Jones' testimony in this case, or he has construed this paragraph to indicate that the reamer in question (namely, the reamer covered by the patent #796,197, the first so-called Double underreamer made), was entirely the invention of Mr. Double, and further, that Mr. Double had conceived of all the changes in that reamer which were made when the Double underreamer in suit was designed, and that Mr. Jones' only part in design and changing in design was merely to express his opinion in the words, "And I told him that I thought the change was a good one."

Now, in regard to the first possible conclusion of Judge Cushman as to the significance of this conversation between Mr. Jones and Mr. Double when first inspecting the *Brown model*; see T. of R., page 884, answer to question 66:

"Well, it is pretty hard for me to remember all the details of the conversation, but the principal feature of it was whether we could manufacture that reamer the way it was or whether we could not, and I tried to explain to Mr. Double that it couldn't be made that way

and, if it was made, it would not be a success when in the well. That was the first thing we had to decide. We didn't want to make anything and send it out as a failure if we could help it.

Mr. Double asked me the question whether it would work or not, and that is what I told him."

Possibly the lower court has confused this incident, as above stated, with the one referred to in Mr. Jones' testimony quoted from the Mills-Double interference suit. Such a misconception would, of course, give Jones' testimony in the two cases the appearance of being entirely contradictory. Such apparent contradiction, however, is entirely dispelled when it is remembered that they refer to two entirely different incidents, and to two entirely different underreamers. True Mr. Jones, when testifying in the present suit, states that he does not recollect any discussion between himself and Mr. Double wherein Mr. Double suggested certain features of construction or made any proposed changes in construction relative to the Double patent #796,197, but it must be remembered that Mr. Jones has repeatedly stated that in the underreamer matters he and Mr. Double, as he expressed it, "worked in unison in such things more or less." In brief, Mr. Jones has never made the contention that he was the sole inventor of the so-called Double underreamer, but that he did design certain of the important elements therein. When asked the question as to whether Mr. Double made any suggestions to him with respect to the drawing he (Jones) had made preparatory to manufacturing the first so-called Double underreamer, he stated,

page 890, answer to question 146: "To the best of my knowledge and belief, he did." Again in answer to question 162 he states: "We both worked in conjunction together more or less on the question, and we decided that it was shown that the one had the best inventive powers, his ideas were generally accepted and it proved the same with this."

Therefore it is quite the logical conclusion that after the first Double underreamer, namely that covered by patent #796,197, had been tried out and proved a failure, as they stated, Mr. Double as well as Mr. Jones, had ideas as to possible improvements in that reamer and that such a conversation quoted above, and which the lower court has contended discredited the testimony of Jones, would be a natural consequence of their united efforts to produce a satisfactory underreamer.

Co-operation in such matters necessarily involves such conversations. Undoubtedly it was only one of numerous such conversations they had in regard to the results they were endeavoring to obtain.

It is to be noted that Mr. Jones' deposition in that Mills-Double interference was quite brief, the direct examination consisting of only fifteen questions and answers and covering less than two pages of testimony. He was not asked to give any particulars as to who was the inventor of the so-called Double underreamer or as to what part he played in such invention or as to the construction of such reamer. As a matter of fact his testimony in that case had to do only with the reamer similar to patent #796,197. And obviously his memory in certain regards was not as clear at that

time as it was when testifying in the present case after having given the matter very careful and thorough reflection. This is illustrated very clearly by his statements in the Mills testimony, in which he states:

Question 12. "What occasioned him to make the remarks about changing the reamer?"

Answer: As he was having a great deal of trouble in manufacturing this reamer in question, that's all."

Now he, as well as Mr. Double and numerous other witnesses, have testified in this case that the reason for changing the construction of the Double reamer after having first tried out the type covered by patent #796,197, was *due to the weakness of the construction* of the reamer and the difficulties occasioned thereby, and not that they were having a great deal of trouble in manufacturing that reamer.

Furthermore, it is to be particularly noted that while, as he states, Double showed him what changes he proposed to make, using the plural form of the word change, he concludes his paragraph with the statement, "and also asked me what I thought of the *change*, and I told him that I thought the *change* was a *good one*."

Hence we see that after all this conversation refers to *only one change* suggested by Mr. Double, and, if Mr. Double did co-operate with Mr. Jones, as Mr. Jones has repeatedly stated, Mr. Double must have, at least, made the suggestion of *one change*. Therefore, we most respectfully submit that this extract from Jones' testimony in the Mills-Double interference suit, instead of discrediting the testimony of Jones in this

case, as Judge Cushman has found, actually substantiated it.

We confess that we are entirely at a loss to account for the lower court's conclusion on this point unless it be on the theory that he was under a misapprehension as to the incident referred to in the quoted testimony. We are confident that Your Honors will be convinced that Jones was a co-inventor and that the Double patent in suit should have been declared invalid.

The complainants-appellees in their brief before this court practically rests their case on an attempt to show that no successful oil well underreamer existed prior to the advent of the Double patent in suit, #734,833; that it promptly made deep well drilling possible and has been used universally and without modification or change since its introduction.

The object of this contention is to establish the Double patent in suit as a pioneer patent in order that it can claim such a broad application of the Doctrine of Equivalence as to cover all subsequent reamers. It is plain that the appellants realize that only a revolutionary and unheard-of application of the Doctrine of Equivalence will meet their case, as counsel has been unable to show that the Wilson underreamer contains either the combination of elements or the mode of operation to be found in the Double device.

That these are fallacies we will herein later prove.

In endeavoring to make out a case to support appellee's charge of infringement of the Double patent #734,833, counsel has formulated his efforts practically, if not almost identically, as set forth in the diagram which follows. A careful study of counsel's argument

and brief and the testimony which he has produced in this case will indicate to Your Honors that this diagram, generally speaking, is full and complete. The diagram is as follows:

~~EES~~
DIAGRAM OF APPELLANT'S CASE.

First: Double, the original and sole inventor of the reamer covered by patent #734,833, namely, the reamer in suit.

Second: The Double patent is a broad, combination patent, the claims of which are not to be limited in scope for the following reasons:

- (a) Double's reamer the first completely successful underreamer. Prior underreamers were failures.
- (b) Double first to use "tilting cutters," operating in open dovetailed slip-ways, tilting over a spreading-bearing.
- (c) The "complete" adoption of the Double reamer and its great success entitles it to be considered a pioneer invention, entitling appellees to a liberal range of the Doctrine of Equivalents.

Third: The Double patent, aided by the "liberal" allowance of the Doctrine of Equivalents is sufficient to include within its scope the pronged type of Wilson underreamer.

- (a) That the separated spaced prongs of the Wilson underreamer are *equivalent* to the hollow slotted extension of the Double underreamer.

- (b) That the straight, parallel cutter-retaining shoulders, 2', on the inner faces of the prongs of the Wilson underreamer are the *equivalents* of the upper and inwardly inclined dovetailed slip-ways of the Double reamer.
- (c) That the tapering or inclined bearing-faces, 9, of the lugs of the Wilson underreamer, which hold the cutters apart when in reaming position, are the *equivalents* of the "opposite parallel bearing-faces of the hollow slotted extension, 6, of the Double reamer."
- (d) That the one-piece body of the Wilson underreamer (capable of assembling the cutters, key and spring at the bottom, and capable of remachining) is the *equivalent* of the two-piece body of the Double underreamer (with its middle joint, and which cannot be assembled at the bottom and which cannot be remachined).
- (e) That the open space between the prongs of the Wilson underreamer body is the *equivalent* of the wall or partition of the Double underreamer with its opposite parallel bearing-faces and with its slot, 7, for the key, serving as a guide for the key and a stop for the downward travel of the key and cutters, and its hollow for the rod.
- (f) That the two lugs or lower projections at the end of the prongs of the Wilson underreamer, whereby the cutters are expanded and held in expanded position while reaming, are the *equivalent* of the stationary well or partition, namely, the hollow slotted extension enterposed between the cutters of the Double underreamer.

- (g) That the detachable block of the original Wilson underreamer or the removable key in the Wilson Improved, which serves as a seat for the spring of the Wilson underreamer and by which means the cutters, spring and tee are held in place in the reamer body, are the *equivalents* of the stationary or fixed shoulder, 5, of the Double underreamer body.
- (h) That the Wilson shanked cutters, having laterally projecting shoulders with bearing-faces thereon, are the *equivalents* of the Double cutters (having no shanks whatever and having V-shaped grooves across their backs forming inward projections, 18, of the Double underreamer cutters, and having no lateral shoulders whatever).
- (i) That the solid forged Wilson tee with a cross-bar head for suspending the cutters is the *equivalent* of the rod or spring-actuated mandrel of the Double underreamer, having the slot in the rod, and a detachable notched key fitting in the rod.
- (j) That the Wilson cutters so mounted upon the solid forged tee that when collapsing they swing together at the lower end, pendulum-like, collapsing between the prongs of the Wilson underreamer, and when so collapsed the spreading means are entirely removed from between the cutters, are the *equivalents* of the "Tilting Double Cutters," which cutters, as Double states, tilt outwardly at the upper end by sliding upon the key to permit collapsing over the lower end of the hollow slotted extension, which hollow

slotted extension is at all times interposed between the cutters whether collapsed or whether expanded.

- (k) That the initial collapsion of the Wilson underreamer cutters, when first drawn downwardly upon the inclined bearing-faces, 9, of the lugs of the Wilson underreamer, is the *equivalent* of the “tilting” action of the Double cutters, which (they admit) takes place only under “abnormal” conditions, which tilting is occasioned by the outward swing of the cutters at the upper end, sliding upon the key, following the inclination of the dovetails of the Double underreamer body.
- (l) That the detachable cross-piece or safety bolt, 11, of the Wilson underreamer is the *equivalent* of the slot, 7, of the Double underreamer, thus forming a stop for the downward travel of the key, key-rod and cutters.
- (m) That the retaining shoulders, 2”, of the Wilson on the inner faces of the prongs, even though they cannot possibly form inner bearings (there being no metal at that place by which any inner bearings can be formed), are the *equivalent* of the dovetailed grooves of the Double underreamer, which dovetailed grooves are provided with inner bearings, thus forming what Judge Cushman of the lower court termed “inner, outer and lateral bearings,” by the interrelation of the dovetailed ways upon the body of the reamer and dovetails upon the cutters of the Double underreamer.
- (n) That all the other differences in construction between the Wilson underreamer and

the Double underreamer, and all the differences in modes of operation and principles of action can be reconciled by the application of the Doctrine of Equivalents.

Fourth: That the Wilson underreamer, owing to this broad scope of the Double underreamer patent, aided by the "liberal" application of the Doctrine of Equivalents, must be found to infringe the Double underreamer patent.

How clear it must be to Your Honors that counsel for appellee has found it absolutely necessary to attempt to build up a case by piecing and patching together a peculiarly varied assortment of unsound contentions, misstatements of facts and law, biased testimony of so-called expert witnesses, new and unheard of expressions of the rule of the Doctrine of Equivalents, together with numerous attempts to so confuse the court's sense of perception as to induce Your Honors to accept counsel's statements as to construction and interrelation of parts and principles and modes of action instead of believing what your own eyes see before you as disclosed by the exhibits in the case. Clearly appellees' case is a fabrication of fallacious statements of law and fact, and must crumble to the ground.

We would at this point direct the particular attention of Your Honors to the fact that, as our diagram indicates, *counsel must rely entirely upon an absurdly distorted application of the rule of Doctrine of Equivalents* in order to make it appear to Your Honors that even one single piece of the Wilson underreamer (much less

the combinations) can come under the claims, or any one of the claims, of the Double underreamer patent. Not one element in the construction of the Wilson underreamer can counsel point to and say that it is like that of the Double. In each and every comparison counsel makes of the elements or combinations of elements of the Wilson with the so-called Double reamer, he claims one to be the EQUIVALENT of the other. He dare not claim them to be alike! In every instance he must resort to his grossly distorted application of the Doctrine of Equivalents in order to bring it even within questionable range of similarity in construction or function.

It would certainly be hard to conceive of a case, and probably no case has ever been presented to Your Honors, wherein the plaintiff was unable to point to a single element of the alleged infringing device, and, without resorting to an unreasonable and totally distorted rule of the Doctrine of Equivalents, say with certainty that this or that element was exactly like the corresponding element in the patented device.

ANALYSIS OF APPELLEES' CASE, OUTLINED BY THE
DIAGRAM ABOVE.

We have deemed it well to diagram appellees' case, believing that it will be of great assistance to Your Honors in your efforts to determine just what appellees' case is based upon, and in order that we may more certainly analyze each and every one of counsel's points and indicate clearly to your minds that without a single exception every one of appellees' points is entirely insupportable, either by law or by fact.

We believe that Your Honors will find it necessary to deal with this narrow Double patent in the same manner that the Supreme Court did under similar circumstances in dealing with a narrow patent, in the face of a claim of pioneership, in the leading case of *Westinghouse v. Boyden*, 170 U. S.

We will take up each point separately and in the order disclosed by the diagram above.

AS TO THE FIRST DIVISION OF OUR DIAGRAM:

That Double was not the sole inventor of the reamer covered by patent #734,833, we believe, has been very clearly set forth previously in this brief and also in our opening brief. Clearly Jones was a co-inventor, and, as such, was entitled to an interest in the patent, and should have joined in the application for that patent. See U. S. R. S., Secs. 4892 and 4895. Accordingly, the Double underreamer patent in suit should have been declared void, as it was fraudulently obtained by Edward Double. We submit that the evidence and testimony in that regard and as set out above in this brief, is entirely conclusive, and that had Judge Cushman of the lower court clearly understood the Jones testimony quoted from the Mills Interference case he could have done nothing else than find that the Double patent was invalid, and accordingly would have dismissed the suit.

Counsel has cited authorities to the effect that where the trial court has seen and heard the witnesses the Appellate Court ordinarily should not disturb the findings of the lower court as to questions of fact. Such doctrine is not inflexible, and we call Your Honors'

attention again to Your Honors' decision in the case of *Wilson et al. v. Bole et al.*, 227 Fed. 607, involving even certain of the witnesses in this present case, and in which case Your Honors sweepingly reversed the decree of the lower court, although all the testimony in that case was taken in open court.

AS TO THE SECOND DIVISION, NAMELY, THAT THE DOUBLE PATENT SHOULD NOT BE LIMITED IN SCOPE.

As we have previously pointed out, counsel for appellee admitted in open court that the Double underreamer patent was strictly a combination patent, a patent covering a new arrangement or combination of admittedly old elements. Your Honors are well aware that such a patent covers simply the combination of elements particularly stated, and set forth in the claims. Such a combination must be regarded as an Entity and that to eliminate any one of the elements of which that combination is composed, or even by retaining those elements, rearranging them and changing the function or the mode of operation of the combination, infringement is avoided. Thus, to infringe the Double patent, as we have stated before, it must be found that the Wilson underreamer is identical with the reamer disclosed and claimed by the Double patent, in construction of elements and interrelation of such elements, and in function; and that each of the Wilson elements performs its function in substantially the same way as that of the Double and obtains substantially the same results.

Now that is as broad and as sweeping construction as counsel for appellees can hope to secure for his

patent, through the aid of the Doctrine of Equivalents. To secure such a broad allowance of the Doctrine of Equivalents, we find counsel asserting, as pointed out in our diagram, subdivision *a* of 2nd division, that he is entitled to such by reason of the complete success of the Double underreamer, and for the reason that it was the "*first completely successful reamer.*" The absolute absurdity of this contention must be very apparent to Your Honors. Swan underreamers, Plotts underreamers, Austrian underreamers, and numerous others had been in use for years both before the advent of the Double, and for years after the Double underreamer in suit was abandoned.

See testimony of B. L. Culver, T. of R. page 236:

"The first time we used the Austrian underreamer it was successful, and we thought it was a great thing. It was a great thing. The first one I used was with a $5\frac{5}{8}$ casing. I was able to lower the casing with it. Probably reamed three hundred feet."

See testimony of Bennett, T. of R. 831:

"Q. 72. Well, if you were to select this reamer you call the Australian (the Canadian) reamer or the Double reamer you have referred to, which would you prefer?

A. I don't think there would be much choice as far as I am personally concerned."

Also T. of R. page 834:

"A. The Double underreamer was not satisfactory. In trying to enter a hard formation that we have encountered in the well of the Sunset Security Oil Com-

pany, we were not able to accomplish the work, owing to the lugs or cutters constantly breaking.” * * *
“Most of them were lost in the hole.”

See testimony of Sam G. Lamb, T. of R. page 858:

“* * * I had one case where I could not get results with the Double reamer. That was in Coalinga. It was in 4½” casing. It would not ream the hole large enough to permit the casing to go through. We did not abandon the hole BUT WE GOT A WILSON REAMER WHICH REAMED THE HOLE AND WE FINISHED THE WELL WITH IT. We did not have a bit of trouble with the Wilson reamer. It did the work satisfactorily.”

As we have pointed out to Your Honors in open court, counsel himself while examining Mr. Jones in the same Mills-Double interference case, which was in August of 1903 (over two years after the Double underreamer first went on the market), brought out the fact that the Austrian underreamer was still at that late date one of the standard underreamers and one of those enjoying the greatest sale.

We quote as follows testimony on behalf of Mills, R. p. 16:

“E. B. Farnsworth, called for further cross-examination.

Question by Mr. Lyons:

X. Q. 21. *The Austrian under-reamer which you referred to is a standard under-reamer, is it not?* A. *Yes, sir.*

X. Q. 22. *And is one of the under-reamers having the largest sale and most generally used?* A. *Yes, sir.”*

With the evidence just recited before Your Honors, how apparent are counsel's misrepresentations! How absolutely unreliable is his contention that the Double underreamer was the "first successful" underreamer and the one which superseded all others! The evidence in this case is replete with testimony from numerous witnesses, both those of appellant and appellee, who had successfully used Swan underreamers, Austrian underreamers, Plotts underreamers, Kellerman underreamers, O'Donnell & Willard underreamers, Day underreamers, and numerous others. True, those witnesses in many instances stated that some of the reamers were not satisfactory, but nevertheless they testified that they did underream the holes and that they lowered the casing with those underreamers. Witness after witness testifies that the Double reamer was not satisfactory. These facts and this testimony just referred to, which constitute an authentic fact of the history of the art of underreaming, as supported by this record, rings far truer than the bald statements to the contrary of counsel and the flimsy testimony of such biased and untruthful witnesses as Griffin and Youle, and like testimony of others.

And in support of our position that those reamers were successfully used both before and after the Double underreamer went on the market permit us to call to Your Honors' minds the fact that probably not one automobile driver of today would consider the automobile of ten or twelve years ago, namely, automobiles of 1905 or 1906, anything but rank failures, highly unsatisfactory, and that they would under no circumstances use such machines. Now that is about analo-

gous to the testimony of the most outspoken of appellee's witnesses condemning the Austrian, Swan, Plotts, North and other reamers which were used prior to the advent of the Double reamer and the Wilson reamer. *Remember, Your Honors, they were testifying twelve years subsequent* to the use of the underreamers in question. During those twelve years the Wilson underreamer and to some extent the Double underreamers, so-called, which incorporated principal elements of the Wilson reamer, had so thoroughly educated the different drillers and oil operators as to what an underreamer really should be and what work they should expect of an underreamer, that several of them testified that none of those old underreamers were "practical" underreamers. The word "practical" is merely a *relative* term.

Now as a matter of fact, the automobile of 1905 and 1906 were very extensively used; they traveled across the continent repeatedly; they were used in automobile races; hundreds and thousands of them were sold and used. We make just the same statement in regard to the underreamers sold prior to the advent of the Double, namely, that hundreds of them were sold and used and hundreds of wells were drilled and the casing lowered after using those reamers. Hence they were the *pioneer* reamers. The Double reamer cannot rob them of that place in the art.

Now it matters not that the Double underreamer was an improvement (and there is some serious question on that point) over the other reamers preceding the Double; the fact that the Double was *promptly abandoned* on the advent of the Wilson underreamer

and that even later types of the Double underreamer so-called were highly unsatisfactory (witness the broken cutters, broken bodies and other evidence before this court), it must be entirely clear to Your Honors that the DOUBLE UNDERREAMER NEVER WAS AND NEVER COULD BE THE "FIRST COMPLETELY SUCCESSFUL UNDERREAMER." The testimony of Wren, Williams, Kibele, Lamb, Bennett, Plotts and many others completely refutes counsel's contention in that regard.

If the Double reamer, covered by patent in suit, was the first "completely" successful underreamer, as counsel states, why was that reamer abandoned? Why has appellee corporation found it necessary to assume the risk of infringement of others' patents by manufacturing reamers of other construction if the Double underreamer in suit was the "first completely successful underreamer"?

The facts completely outweigh counsel's false contention.

Our contention that the Wilson underreamer made the underreaming art a complete success and that the Double underreamer was a mere transitory step in the art and abandoned in favor of the Wilson underreamer, is borne out by the fact that the record shows that the Wilson underreamer and Wilsonized Double underreamer were the reamers which have practically superseded all other underreamers, and by the further fact that no one has ever improved upon the Wilson underreamer or put any such improvements into practice, so that since the year 1904 the Wilson invention has stood in the trade and in the field as the *sine qua non* in reaming practice, that is, the invention without use

of which truly successful underreaming cannot be performed. The Double reamer stands superseded. No reamer has ever superseded the Wilson reamer.

The courts have very jealously guarded the public against the assertion of pioneership by patentees, and where all the parts of a combination were old, and devices had been previously produced for performing the functions or substantially the functions of the subject of the patent in question, and had actually been used, it has been the tendency of the courts to call such patents merely "improvement" patents. In the noted Selden patent case, involving the automobile, decided in 1911 by the Circuit Court of Appeals, Second Circuit, as reported in 184 Fed., at page 893, the court after saying—

"Every element in the claim was old, and the combination itself was not new,"

went on to point out that the patentee Selden had adopted the constant pressure type of internal combustion engine, while the defendant had adopted the varying pressure type, both types being well-known in the art. The patent was found to be strictly limited to this constant pressure type and so not infringed. The patent was found to be entitled to a fair and reasonable, but not broad range of equivalents, and it was held that the constant pressure type was not the equivalent of a varying pressure type of engine and that therefore infringement did not lie. The patentee deliberately introduced in his patent such constant pressure type motor, as Double in his patent in suit here introduced and limited himself to the hollow slotted extension type of reamer, a type well-known in the art,

for instance, by the Swan and O'Donnell and Willard prior reamers. Having so limited himself, the radically different spaced or pronged type of reamer of Wilson, in which the prongs co-operate entirely with the cutters for expansion and collapsion were radically new, cannot be found to infringe the mere improvement and not pioneer patent of Double. Turning to Walker on Patents, we find the following matter in section 184 of interest:

“The prior state of the art, to which an invention belongs, must be considered in construing any claim for that invention, although the art may have been advanced to that stage, by a prior invention of the same inventor. The leading cases on this subject are *McCormick v. Talcott*, and *Railway Co. v. Sayles*, and *Morley Machine Co. v. Lancaster*, and *Kokomo Fence Machine Co. v. Kitselman*.”

“The doctrine of the *McCormick* case is as follows: The original inventor of a machine, will have a right to treat as infringers all who make machines operating on the same principle, and performing the same functions, by analogous means, or equivalent combinations; even though the infringing machine be an improvement on the original, and patentable as such. But if the invention claimed, be itself but an improvement on a known machine, by a mere change of form or combination of parts, the patentee cannot treat another as an infringer, who has improved the original machine, by use of a different form or combination, performing the same functions. The inventor of the first improvement cannot invoke the doctrine of equivalents to suppress any other

improvement which is not a mere colorable invasion of the first."

"The meaning of these four cases seems to be that every inventor is entitled to claim whatever he was the first to invent. If A. B. is the first to invent mechanism to perform a particular work, and if his mechanism is substantially incorporated into subsequent machines which do that work, then A. B. is entitled to such a construction of his patent as will be infringed by those later machines; but if C. D. is a mere improver on A. B.'s machine, C. D. is not entitled to such a construction of his patent, as will cover the machines of still later inventors, who have improved on A. B.'s machine in a substantially different manner. It follows from these doctrines that C. D.'s patent must be construed in the light of A. B.'s machine, and indeed of every other similar and older structure; which is the same thing as saying that every patent must be construed in the light of the state of the art, at the time the invention it covers was produced."

"The state of a particular art, at the time of a particular invention, includes whatever inventions, belonging to that art, had been already invented and used in the United States, or patented, or described in any printed publication, in any country. And an invention is patented in the eye of this law, where it is fully shown in the drawings of a patent, though not described in the specification. Patents take rank in an art in the order of their numbers; except where that order is different from the order of the dates upon which they were applied for, in which case they take rank in the order of those dates."

The Double patent must be strictly construed, and as pointed out in section 186 of Walker on Patents, the patentee cannot show that his invention is broader than the terms of his claims; or, if broader, the patentee must be held to have turned over the over-plus to the public, as held in *Keystone Bridge Co. v. Iron Co.*, 95 U. S. 278. The public, it is stated, should not be deprived of rights supposed to belong to it without being clearly informed as to what limits those rights. In other words, the language of the claims is a notice to the public of what it shall not do. It was not incumbent upon Wilson to go further than the plain notice of the limited Double claims, and such plain language is such as to these Double limited claims, that he who runs may read, to the end that he who reads may run, but only from the clear inhibition of the terms of the claims. As stated in *White v. Dunbar*, 119 U. S. 51:

“Some persons seem to suppose that a claim in a patent is like a nose of wax which may be turned and twisted in any direction, by merely referring to the specification, so as to make it include something more than, or something different from what its words express. The claim is a statutory requirement, prescribed for the very purpose of making the patentee define precisely what his invention it; and it is unjust to the public, as well as an evasion of the law, to construe it in a manner different from the plain import of its terms.”

It was also well said in *Adams & Westlake Co. v. Peter Gray & Sons Inc.*, 206 Fed. 303, on page 307:

“When the improved result is due to a more exact or refined application of old principles, care

must be taken to limit the claims to those new features which give the better result; otherwise one who has made what is perhaps the best application of old principles may lay too broad a claim to the use of that which other improvers are also at liberty to apply."

Likewise see the recent decision in *Evans et al. v. Hall Printing Press Co.*, 223 Fed. 539 (C. C. A.), in which, on pages 541 and 542, the following appears:

"The inventor can, of course, use any language he wishes in describing his invention and in stating his claims. Having done so, however, he must abide by the phraseology chosen. It is then too late to reconstruct his claims by adding or subtracting from the language used. This rule may result in hardship in many cases, but a contrary rule would work a far greater injustice and would enable the patentee to hold as infringers those who have invested their capital in what they supposed, relying on the plain language of the patent, to be a perfectly legitimate business. When the language of the claims of a patent is clear and distinct, the patentee is bound by it. *Keystone Bridge Co. v. Phoenix Iron Co.*, 95 U. S. 274, 24 L. Ed. 344; *Merrill v. Yeomans*, 94 U. S. 568, 24 L. Ed. 235.

"We know of no authority where a defendant has been held as an infringer of a combination claim where he omits three of the elements of the combination. If the defendant omits one or more of the elements which make up the combination he no longer uses the combination. It is no answer that the combination operates as well without as with them. The patentee was at liberty to describe his combination as he saw fit, having

done so, the rights of the public are involved and the court cannot construe the claim precisely as if all reference to the said printing surfaces were omitted.”

It would be a rank injustice for any court to hold that where a patentee has limited himself to such an element, for instance as a hollow slotted extension of an underreamer body having parallel opposite bearing-faces, were all the dictionary at his command to more particularly define his invention if the prior art permitted, one who operated entirely outside of such language and any possible rational interpretation of the same, should be held as an infringer. We invite the court's attention particularly to the many and various limitations voluntarily introduced by Double in his file wrapper and contents of the Double patent in suit, which file wrapper and contents appears in the book of exhibits commencing at page 227. This should be closely studied so that the court may determine how voluntarily, explicitly and unmistakably and irretrievably the patentee Double, after various citations of prior devices, such as the Swan reamer, limited his specification and claims in order to obtain the narrow patent finally granted to him.

We have it upon the authority of counsel for appellees that such limitations of the file wrapper and contents of a patent in suit are very serious things, and to show how counsel of appellees appreciate this fact, although he was making wrong of it, as we contend, in that case, we quote from appellant's reply brief in cause 2918, on pages 49 to 52, as follows:

“As said by the Circuit Court of Appeal in Dowagiac Mfg. Co. v. Superior Co., 115 Fed. 886:

‘Whatever doubt there might have been as to whether the claim was limited to the construction of its language by the specification it was removed by the limitation which he put upon it by his explanation, the consequence of which was the allowance of his patent, and the claim must be read as limited in this respect in the same way as are the other claims.’ ”

“And as said by the court in Peifer v. Brown, 112 Fed. 435:

‘A claim must be construed as limited by amendment and acquiescence in the patent office.’ ”

“And, as said by the court in Kelly v. Clow, 89 Fed. 297, a Circuit Court of Appeal case:

‘He cannot claim such a construction of his patent as would include what he was expressly required to abandon as a condition of the grant, even if it takes away a material part of his real invention.’ ”

“And as said by the court in Sutter v. Robinson, 119 U. S. 530:

‘Complainant is not now at liberty to insist upon a construction of his patent which will include what he was expressly required to abandon and disavow as a condition of the grant.’ ”

“And, as said by the Supreme Court in Roemer v. Peddie, 132 U. S. 313:

‘This court has often held that when a patentee, on the rejection of his application, inserts in his specification, in consequence, limitations and restrictions for the purpose of obtaining his patent, he cannot, after he has obtained it, claim that it shall be construed as it would have been construed if such limitations and restrictions were not contained in it.’ ”

“And, as said by the Supreme Court of the United States in *Leheigh Co. v. Kearney*, 158 U. S. 461:

‘Acquiescence in the rejection of a claim and restriction by amendment limits the construction of the claim to the devices shown.’ ”

“As said by the Circuit Court of Appeal for the Second District, in *Green v. Buckley*, 135 Fed. 520:

‘Where the patentee *specifies a particular form as a means by which the effect of the invention is produced*, or otherwise confines himself to the particular form of what he describes, he is limited thereby in his claim for infringement.’ ”

“And as said by the Supreme Court in *Wright v. Yengling*, 155 U. S. 47:

‘The patentee having described in his specification and declared it to be an essential part of his invention an element thereof, and having made it a subject of his claims, is not now at liberty to say it is immaterial or that a device which dispenses with it is an infringement though it accomplish the same purpose in perhaps an equally effective manner.’ ”

“It is a well-known rule of construction that in a given contract or instrument the same general words of description must be given the same meaning.

“As said by the Circuit Court of Appeal for the Eighth Circuit in *Moon-Hopkins Billing Machine Co. v. Dalton Co.*, 236 Fed. 936:

“When an applicant for a patent inserts limitations and restrictions to comply with rulings of the patent office he cannot afterwards have a construction of his patent as though the limitations and restrictions were not contained in it.’ ”

"As said by the Supreme Court in *Computing Scale Co. v. Automatic Scale Co.*, 204 U. S. 609:

'Before taking up the record as disclosed in the file wrapper and contents, we may premise that it is perfectly well settled in this court by frequent decisions that where an inventor, seeking a broad claim, which is rejected, in which rejection he acquiesces, substitutes therefor a narrower claim, he cannot be heard to insist that the construction of the claim allowed shall cover that which has been previously rejected. *Corbi Cabinet Lock Co. v. Eagle Lock Co.*, 150 U. S. 38-40, 37 L. Ed. 989, 990, 14 Sup. Ct. Rep. 28, and cases there cited.' "

"A late statement of the rule, and one as favorable to the inventor as the previous cases would admit, is found in *Hubbel v. United States*, 179 U. S. 77, 88, 45 L. Ed. 95, 98, 21 Sup. Ct. Rep. 24, 25, as follows:

'An examination of the history of appellant's claim, as disclosed in the file wrapper and contents, shows that, in order to get his patent, he was compelled to accept one with a narrower claim than that contained in his original application; and it is well settled that the claim as allowed must be read and interpreted with reference to the rejected claim, and to the prior state of the art, and cannot be so construed as to cover either what was rejected by the patent office or disclosed by prior devices. *Leggett v. Avery*, 101 U. S. 256, 25 L. Ed. 865; *Shepard v. Carrigan*, 116 U. S. 593, 29 L. Ed. 723, 6 Sup. Ct. Rep. 493; *Knapp v. Morss*, 150 U. S. 221, 227, 37 L. Ed., 1059, 1061, 14 Sup. Ct. Rep. 81.' "

"This is not a case where the amendment made to the claim was in regard to a minor or merely incidental element of a combination, but where the

amendment was made to describe and set forth and distinctly claim (as required by Sec. 4888 R. S. U. S.) the particular *construction and form* of the particular element which gave the claimed novelty to the combination, so that this limitation is of the essence of the claim."

As further said in *Oriental Tissue Co. v. Louis de Jonge & Co.*, 235 Fed. at page 296, quoting from *Victor Talking Machine Co. v. Ameranc Graphophone*, 151 Fed. 601, as follows:

"The applicant for a patent is entitled to specify any claim in his application the subject-matter of which he believes himself to be the original inventor, and to persist in his assertions and claims until final action thereon by the patent office. But when his claims are rejected on references cited against them, he is called upon to exercise his election between insistence and appeal or desistance and acquiescence. And while the language of the patent as issued may not be contradicted by mere voluntary expressions of opinion, or argumentative suggestions made by the applicant in his communications to the patent office, especially where no change is made in the claims, and while a patentee is entitled to the benefit of such equities as may be properly raised in his behalf from the transactions disclosed in the file wrapper, yet, on the other hand, the public is interested in securing due limitations upon the claim of an exclusive monopoly on the ground of patentable novelty, and is entitled to the benefit of admissions imposed upon the applicant as a condition precedent to the allowance of the patent.

* * * 'Undoubtedly a patent, like any other written instrument, is to be interpreted by its

own terms. But when a patent bears upon its face a particular construction, inasmuch as the specification and claim are in the words of the patentee, it is reasonable to hold that such a construction may be confirmed by what the patentee said when he was making his application. 'The understanding of a party to a contract has always been regarded as of some importance in its interpretation.' *Goodyear Dental Vulcanite Co. v. Davis*, 102 U. S. 222, 227, 26 L. Ed. 149.

* * * While, an applicant for a patent may state that some portion of said territory is the property of another or is held in common by the public, he acquiesces in such statement and alters his boundaries accordingly, he is concluded by such abandonment, and cannot afterward undertake to define his territory *by rolling stones*, which he may move about across the lines of his original boundaries so as to appropriate property previously conceded to belong to others."

Surely when Double cancelled claim 8, which he would have it in effect still remains in his patent, and substituted narrow claim 7, and amended his claims to provide for opposite parallel bearing-faces upon his hollow slotted extension, he forever put away from his claim of monopoly those things clearly excluded by such surrender of scope and particularly of definition of his alleged invention. No one can be doing wrong for using what Double thus disclaimed.

Your Honors have just decided an appeal adversely to appellant represented by same counsel as represents appellees in the case at bar, opinion by Your Honor Judge Hunt, *Ward v. Rogers Bros. Co.*, reported in the advance sheets of June 14, 1917, 241 Fed. 257, in

which Your Honors refused to adopt the strained interpretation of the patent in suit urged by counsel, in order to piece it and fit it over the alleged infringement. There counsel apparently attempted to build up a hypothetical claim for the patent, under his time-worn fallacious attempt to make out infringement where results are somewhat common both as to the patent and the alleged infringing device. As Your Honors said in *Riverside Heights etc. v. Stebler*, reported in advance sheets of Federal Reporter May 24, 1917, 240, 703, if the device of defendant shows a specifically different mode of operation, even though the *result* of the operation of the machine remains the same, infringement is avoided.

Clearly counsel is making out a poor case again in his attempt to show that because Wilson has cutters which expand and collapse, as all underreamer cutters from time immemorial have done, the Wilson reamer must infringe the Double reamer because it likewise has cutters in which the *result* of the expansion and collapse of cutters occurs.

ANSWERING DIVISION B OF SECOND DIVISION OF
DIAGRAM.

That Double was not the first to use "tilting" cutters operating in open dovetailed slip-ways, and collapsing over spreading-bearings, has been clearly pointed out to Your Honors before. The Jones Round Nose reamer had dovetailed cutters operating in open dovetailed slip-ways, said cutters extending the periphery of the body to contact with the casing shoe high above the spreading-bearings, and high above the fulcrum

point, just the same principle of action counsel is claiming was a novel feature of the Double reamer. The Jones cutters collapsed over a spreading-bearing which was hollow; its cutters had inward depressions or grooves across the back which corresponded exactly with the V-shaped grooves across the back of the Double cutters. That reamer even had a middle joint with the shoulder forming a seat for the spring, just as the shoulder, 5, of the Double. That Double saw a wooden model of small size of that reamer prior to the time the Double reamer #734,833 was made up or even conceived of has been clearly established by testimony in evidence in this case. Also see Double testimony, T. of R. pp. 981-982, X. A.'s 278-281, as to Double first seeing Jones Round Nose reamer.

As we have pointed out in this brief and in appellant's reply to appellees' brief in case No. 2918, the Jones Round Nose reamer was suppressed by notice from the present counsel for Double that such reamer infringed patents issued or to be issued to Double. We have proven that this Jones Round Nosed reamer was seen and shown by Double before his alleged invention of the reamer of the patent in suit; and therefore under well established principles of patent law, if, as counsel charged, this Jones Round Nosed reamer infringed or could infringe the patent in suit, it must, being prior to the alleged invention of said patent, anticipate the same. As we have pointed out, the only material difference between this Jones Round Nosed reamer and the reamer of the patent in suit consist in its fixed tee head for carrying the cutters in substitution for the removable key guided in slotted interposed spreading-

bearing. The hollow interposed spreading-bearing is present.

Furthermore, the lower court found that this tilting action of the cutters, as disclosed in the Brown patent, was identical with that of the Double with the exception of the fact that, as the court erroneously stated, the cutters were not actuated by the downward motion of the suspension means. That finding we have proven in our opening brief was erroneous; that the Brown cutters must travel downwardly as the suspension means travels downwardly, and are positively actuated by such suspension means. Therefore, the Brown reamer discloses identically the same method of "tilting" the cutters as that of the Double. Of course, Double was taught that "tilting" action by the Brown patent.

Your Honors will be convinced that the Double patent has not a single claim so worded as to cover an underreamer having tilting cutters slidably mounted in open dovetailed slip-ways and collapsing over a spreading-bearing *unless the reamer has all of the other numerous elements and combinations mentioned in the claims, and with the same principle of action and modes of operation as those clearly specified and set forth in the claims of the Double underreamer patent.* In other words, the dovetailed tilt-slips operating in open dovetailed slip-ways and collapsing over a spreading-bearing interposed between the cutters, was old and the Double invention (regardless of who invented it) *consisted solely and simply of additional minor elements combined with the features which appellees claim to be the Double invention* (but which in reality was

the invention of other and prior inventors), such minor elements being the notched key fitting in a slotted rod; the upwardly and inwardly inclined dovetailed slipways; the hollow slotted extension with opposite parallel bearing-faces instead of tapering or inclined faces, as on the Swan or the Jones; those features in combination with a cutter having upwardly and inwardly inclined dovetailed shoulders to coact with the dovetails on the reamer body, and to have an inward projection, 26, at the back of said cutter for the purpose of coacting with the lower end of the hollow slotted extension, etc.

As Your Honors know, all of those specifically and clearly described elements which go to make up the combination disclosed in the Double patent in suit are each and every one essential and indispensable to the combination covered by the Double patent claims, as they are the very means of producing the "tilt," and other actions essentially characteristic of the Double reamer. Therefore, the *hypothetical underreamer, or combination, rather, which counsel for appellee urged as being the underlying original Double invention and which Judge Cushman of the lower court erroneously accepted as being the Double invention, can in no sense be held to be the Double invention*, for the reason that the reamer in suit included other elements which made up the invention and which are the distinguishing elements of the claims.

Accordingly, the Double claims are powerless as against other underreamers including the same hypothetical combinations, but not including the other elements and combinations of the claims, which Judge

Cushman failed to include in his statement of what the Double invention consisted.

Even erroneously assuming that Double invented the hypothetical combination Judge Cushman found to be his invention, the Wilson reamer does not contain it, *for it has no tilting cutters, nor has it any dovetails on the body interrelated with any dovetails on the cutters. It has merely retaining cutter-ways and cutters with shouldered shanks.*

A large amount of space is consumed in appellees' brief upon what purports to be a parallel comparison of the elements comprising the Double claims and the features of the Wilson underreamer. In this comparison it is to be noted that the elements of the Wilson device are described, not in the terms of the Wilson patent, but in the language of the Double patent claims. By calling the elements and parts of the Wilson reamer by the names of widely different parts in the claims of the Double device, the appellee professes to see the following elements appearing in both: The internal shoulder, 5, in the mandrel; the slip-suspending key in the spring-actuated rod; the opposite parallel bearing-faces of the hollow slotted extension, 6; the open-sided dovetail slip-ways, 9; the rounded lower end surface, 25, upon which the shoulders, 18, of the cutters ride in expansion; a hollow (in the mandrel) to allow rod 11 to work up and down; the key slot in the hollow slotted extension; tilting slips, 15, furnished with inward projections, 18.

We fail to find any other elements, specifically treated of in this purported comparison of the Double underreamer patent claims and the features of the Wilson

underreamer and commented upon by appellees. However, prior and subsequent to this comparison the appellees' brief discoursed at length upon counsel's hypothetical combination of elements and modes of operation, consisting of dovetailed tilt slips acting in conjunction with dovetailed ways.

It is strange that the appellees do not point out the claims in their patent which secure this combination upon which counsel rests his case. In his minute discussion of the claims of the Double patent he has had ample opportunity to clear up this point, and it certainly belongs logically to that discussion. Yet he fails to show that this hypothetical combination is covered by any single claim in his patent. We consider this point to be an important part of the case simply because the appellees rest their case upon it, and we ask Your Honors to direct your attention to the fact that this hypothetical and imaginary combination, claimed by the appellees to be the substance of the Double invention, is not covered or suggested by any claim in the patent in suit. If this combination of the tilting action of the dovetail cutters in the dovetailed slip-waps at the sides of the downward extension of the mandrel or body were fully covered by the claims in the patent in suit, it would not be infringed by the Wilson underreamer in which the interrelation of the parts results in an entirely different mode of operation, that the Wilson cutters certainly do not "tilt," is fully proven by appellees' expert Knight, and the mode of operation during the collapsion of the cutters is entirely different in the two reamers, as we have pointed out. In the Double device in suit the slips

“tilt” over the spreading member. In the Wilson underreamer the cutters simply *swing between* the two spreading members. Their construction is different and their mode of operation is different.

In the whole of this comparison the appellees fail to prove that the Wilson underreamer contains the elements or has the same mode of operation of the reamer of the claims of the Double patent in suit; and the burden of proof was upon appellees to establish beyond a reasonable doubt that the Wilson reamer contained all of these elements and that their modes of operation were identical, due to the very requirements of the claims of the patent.

In the face of all these things, the hypothetical claim of appellees appears to be merely an hallucination of counsel's over-taxed brain, produced in his laborious efforts to reconstruct the Double patent to fit it to the exigencies of the case.

SUBDIVISION C OF DIVISION 2 OF DIAGRAM.

Appellee contends that “adoption” and “complete” success of the Double reamer entitled appellee to the benefits of a pioneer patent.

Appellee's brief and all of his witnesses refer constantly to what the Double underreamer now does and how it now operates. It is now an infringement of the Wilson patent, and has been ever since the failure of the original Double device covered by the patent in suit.

S. F. Peet, whose testimony is quoted on page 18 of appellee's brief [T. of R. p. 119], says:

“The percentage of the Double underreamer (sold) is very large.”

Chas. P. Barnes, testifying for the appellant, and quoted on page 14 of the appellee’s brief [T. of R. p. 117], says:

“During the last two years think we have sold about two hundred Double underreamers and six or eight Wilson underreamers.”

Since all of these Double underreamers have been held to be infringements of the Wilson underreamer, as the original Double device had been abandoned long prior to the time the witness made this statement, this evidence proves the importance of the Wilson invention rather than the success of the Double reamer.

William E. Youle, who testifies for the appellee so vehemently that he becomes profane on the witness stand, says (appellee’s brief p. 15):

“Now, if I saw that reamer hung on a stem swinging over the hole, I would be inclined to think they were using the Double (the witness points to the Wilson reamer in front of him.)”

This also refers to the similarity in appearance of the Wilson underreamer and its infringement by the Wilsonized Double. No experienced driller would ever be in any doubt as to the different appearance of the Wilson underreamer and the original Double device with its narrow slips which resembled those of the Swan.

Thomas J. Griffin, testifying for the appellees, says (appellee’s brief p. 23, T. of R. p. 94):

“Stated that from seventy-five to eighty per cent of reamers used in California are Double reamers.”

That is, they are Double’s infringement of the Wilson underreamer.

The witness S. S. Frampton, testifying for the appellee, states (appellee’s brief p. 30, T. of R. p. 429):

“Have used the Double reamer more or less ever since.”

We have thoroughly established the fact that the reamer of the Double patent in suit was not a “complete success”; that it was not an underreamer of “great merit”; that it did not “supersede all other makes of underreamers”; but that on the other hand it was merely a trivial *step in the art*—possibly a slight improvement over the prior art, but was soon *entirely abandoned*; that the reamers testified of by Peet of the Fairbanks-Morse Co., and Barnes of the Cal. Natl. Supply Co., as having been sold by them, was *not* the Double reamer in suit, but was the infringing Wilsonized reamer. That, furthermore, even the combination Double-Wilson underreamers, which have been declared infringements of the Wilson patent, are far from a “complete success.” See testimony of appellee’s salesman, Mr. Youngken, page 546, of the record which reads, as follows:

“During the last two years in which I have been visiting the oil fields regularly, I do not remember of having seen a broken tee of spring-actuated mandrel of Wilson underreamer; I do not remember of having seen any broken Wilson underreamer cutters. On

the other hand, I have seen broken Double cutters practically every trip I make through the fields. I saw a broken Double underreamer body on my last trip through the fields, the same reamer or reamers I have seen at previous times. I don't recollect of seeing any new breakages in the underreamer or cutters within the last two or three months. I possibly have, but I do not recollect just the exact incident right now. There are a number of broken Double underreamer bodies which I have seen in the field during the last three months. The dovetails would be broken out of them."

Mr. Youngken has been employed by the Union Oil Company, the Union Oil Tool Company, and the Union Tool Company, for about twenty years. For several years he has represented the Union Oil Tool Company, spending about all his time in the field, traveling from one field to the other, making reports on the service of different tools, etc. He is probably the best informed man they have in their employ as to the use of various oil tools throughout the field. Therefore, his testimony in regard to breakage of the Double underreamers, and in regard to his failure to see or to know of any broken Wilson underreamer cutters and very little breakage at all of Wilson underreamers, shows very conclusively that it is not the Double underreamer which has been "the completely successful underreamer," even though such so-called Double underreamer includes some of the principal elements of the Wilson underreamer.

Hence, we submit that such sale and use of the Double underreamer of the patent in suit, which reamer has long since been abandoned, *was never attended by*

such adoption and successful use as would warrant Your Honors in according the Double underreamer patent any special privileges or any unusual allowances of the Doctrine of Equivalents.

AS TO THE THIRD DIVISION OF DIAGRAM OF APPELLANT'S CASE:

As to counsel's contention that the Double patent, aided by a "liberal" allowance of the Doctrine of Equivalents, is sufficient to include within its scope the pronged type of Wilson underreamer: In support of counsel's contention, he relies chiefly upon the decision of the Supreme Court in *Bates v. Coe*, 98 U. S. 31. Regarding the scope of the Doctrine of Equivalents, the Supreme Court in that decision says:

"In determining about similarities and differences, courts of justice are not governed merely by the names of things, but they look at the machines and the devices in the light of what they do or what office or function they perform, and how they perform it, and find that a thing is substantially the same as another, if it performs substantially the same function or office in substantially the same way to obtain substantially the same result; and that the devices are substantially different when they perform different duties in substantially the same way, or produce substantially a different result."

"*Calhoun v. Ring*, 1 Cliff. 620."

We wish to quote from some other cases on the scope of the Doctrine of Equivalents, as follows:

"We know of no authority where a defendant has been held as an infringer of a combination

“claim where he omits three of the elements
“which make up the combination, he no longer
“uses the combination. It is no answer to assert
“that the omitted elements are not essential and
“that the combination operates as well without
“as with them.”

Evans *et al.* v. Hall Printing Press Co., 223
Fed. p. 539.

“An infringement involves substantial identity,
“whether that identity be described by the terms
“‘same principle,’ same ‘*modus operandi*’ or any
“other. * * * The arguments used to show in-
“fringement assume that every combination of
“devices in a machine which is used to produce
“the same effect, is necessarily an equivalent for
“any other combination used for the same pur-
“pose. * * * This is a flagrant abuse of the
“term “Equivalent.”

Burr v. Duryee, No. 1 Wall, 531, 572.

“To make one mechanical device the equivalent
“of another it must appear that it not only pro-
“duces the same effect, but that such an effect is
“produced by substantially the same mode of
“operation.”

5 Bann and A., 4.

See Walker on Patents,, Sec. 353, and cases
cited.

So much has been said by counsel as to the extent to
which the Doctrine of Equivalents can broaden the
scope of the claims of a patent, that it certainly must
be quite clear to Your Honors that counsel for appellees
exceeds every bound of reason when he attempts to so
extend that doctrine as to make it possible to read the

claims of the Double patent upon the Wilson underreamer. For instance, in regard to subdivision a of the third division of the diagram of appellee's case as shown herewith; to attempt to show that the pronged type of the Wilson underreamer is the equivalent of the hollow slotted extension type of the Double underreamer, such extension having opposite parallel bearing-faces, and with a slot or key-way, 7, also the upwardly and inwardly inclined dovetails, even with the assistance of the most liberal allowance of the Doctrine of Equivalents, counsel must show beyond reasonable doubt that the pronged construction of the Wilson underreamer produces substantially the same result, and that such result is produced in substantially the same way by substantially the same mode of operation. "If the defendant omits one or more of the elements which make up the combination, he no longer uses the combination." Furthermore, it must be remembered that "devices are substantially different when they perform in substantially the same way, or produce substantially a different result."

To prove sufficient differences to negative counsel's contention we will again call the attention of Your Honors particularly to the fact that the "opposite parallel bearing-faces" of the hollow slotted extension of the Double underreamer cannot possibly cause expansion or contraction of the cutters while the cutters are moved either upwardly or downwardly and while contacting with those faces. On the other hand, the spreading-bearings, 9, on the edges of the lugs, 2', at the lower ends of the prongs in the Wilson underreamer body *do* give the Wilson cutters their initial collapsion

when drawn inwardly on said bearings, and also *do* produce the final expansion of the Wilson cutters when drawn upwardly into expanded position.

That difference in mode of operation alone is quite sufficient to negative any possible charge of infringement of the Double underreamer patent.

The upwardly and inwardly inclined dovetailed cutter-ways of the Double underreamer do, according to appellees' so-called experts, Knight and Griffin, under what they term "abnormal operations," produce a slight expansion and a slight contraction of the cutting edge of the cutters by causing the cutters to swing outwardly on the key when the cutters are collapsed, and by pinching the cutters together at their upper ends as the cutters are drawn upwardly into an expanded position, causing the cutters to slide inwardly on the key, viz., to "tilt."

See testimony of so-called expert witness Griffin, T. of R. p. 624, answer to Q. 625, as follows:

"A. Well, if the tool is being expanded and contracted normally by going in and out of a shoe, there is no such movement; but if the tool is being expanded and contracted owing to the operation of the tools in a hole, and the hole pinching on the ends of the cutters, THEN THE UPWARDLY AND INWARDLY INCLINED DOVE-TAILS ACT UPON THE CUTTER AND ASSIST IT IN EXPANDING AND ALLOWS IT TO CONTRACT, BUT DOES NOT ASSIST IT IN CONTRACTING."

On the other hand, as to the action of the straight parallel ways, 2", of the Wilson reamer, they do not

and cannot cause or participate in any of the swinging pendulum-like action of the cutters, as Griffin admits in the following testimony [T. of R. p. 632, Q. and A. 664]:

“Q. 664. And under no circumstances, either due to the pinch or anything else, can the parallel dovetails on the body of the Wilson underreamer cause tilting of the cutters by engagement with the dovetails on the cutters—is that correct?

“A. Yes, that is correct.”

It should be particularly noted that this is an entirely different mode of operation from the expansion and contraction of the Wilson underreamer cutters due to the inclination of the Wilson underreamer bearing-faces, 9, for the reason that, with the Double underreamer, their experts admit that expansion of the Double cutters while bearing upon the opposite parallel faces of the hollow slotted extension takes place only during “abnormal” conditions, and that such is produced by the inclined dovetails. Furthermore, that such an expansion and collapsion is due to a contact at the opposite side of the fulcrum or pivotal point of the cutters from that which takes place with the Wilson underreamer. Clearly such a contraction and expansion of the Double underreamer cutters is a “teetering” or, as Double states it, a “tilting” action of the cutters, due to the cutters sliding inwardly or outwardly upon the key and causing an opposite travel of the cutting edge of the cutters. Now, with the Wilson underreamer cutters, the collapsion takes place owing to the inclination of the bearings, 9, of the Wilson under-

reamer body and has no effect whatever upon the upper ends of the cutters, or at the point of contact upon the solid tee head to which the cutters are suspended. The cutters remain absolutely stationary upon the tee head at that point, owing to the fact that they are confined closely between the head of the tee and the parallel retaining shoulders of the Wilson underreamer body, and there can be no travel of the cutters upon the tee while so confined and while expanding or contracting. The cutters swing *pendulum-like* from the tee, and their expansion is produced entirely by being drawn upwardly upon the lugs of the Wilson underreamer body, and collapsion is produced by the cutters being drawn downwardly until the cutters are drawn entirely off of and below the lugs of the reamer body.

It certainly requires no expert knowledge whatever to readily discern that the mode of operation whereby the Wilson underreamer cutters are expanded or collapsed is totally different from that of the Double underreamer; *that the prongs of the Wilson underreamer body can in no sense be considered the equivalents of the hollow slotted extension of the Double underreamer body. The hollow slotted extension of the Double underreamer body is, at all times, interposed between the cutters, whether the cutters are being expanded or contracted. The Double cutters must "tilt" on the key and "teeter" over the lower end of the hollow slotted extension. That is not at all the operation of the Wilson underreamer cutters. As has been pointed out repeatedly to Your Honors, the Wilson underreamer cutters swing pendulum-like between the prongs; they do not slide or titlt on the tee. They are*

so constructd by means of lateral shoulders with bearing-faces, 4³, on said shoulders to contact with the separated or spaced spreading-bearings, 9, on the Wilson underreamer lugs, that when they are collapsed the SPREADING MEANS, viz., the *lugs of the Wilson underreamer prongs*, ARE ENTIRELY WITHDRAWN FROM BETWEEN THE CUTTERS. The difference in mode of operation and the difference in construction and principle of action from that of the Double underreamer certainly must impress Your Honors as being very marked indeed.

The interposed spreading-bearing in the Double *required* the working V-shaped notch, 26, in the cutter. It is not present or needed in the Wilson.

Another great difference between the pronged type of Wilson underreamer and the hollow slotted extension type of the Double is that with the Double underreamer, as will be seen indicated, the slot, 7, performs a function which does not exist at all in the Wilson underreamer body, viz., it forms a guide for the key.

In regard to that slot, Thomas J. Griffin, their so-called witness, testifies on page 107 of the record as follows:

"Inasmuch as the Wilson underreamer is an extended fork it is not necessary to have a slot."

In view of the very great importance of this slot, 7, of the Double underreamer body and the functions it performs, the Wilson underreamer body of the pronged type *having no slot* or key-way, nor is such slot necessary, as testified to by Griffin as quoted above, it cannot possibly be held to be the equivalent of the hollow

slotted extension type of the Double underreamer body. The leading cases quoted above establish the rules which are all we need to rely upon when considering the differences in the principle of action and modes of operation just noted and resultant avoidance of infringement.

This slot 7 of the Double underreamer body performs still another very important function, and, which we have previously pointed out, is accomplished in the Wilson underreamer by an entirely different means; we refer to the oft mentioned function of the slot 7 of the Double underreamer body, serving as a stop for the downward travel of the key, limiting the travel of the cutters when collapsing and preventing them from being withdrawn entirely from their slip-ways. Were it not for such a stop, the cutters would be lost in the hole. We have called Your Honors' attention to this marked difference in construction, and pointed out the function and the purpose of the slot 7 of the Double underreamer body extension on pages 86 and 87 of our opening brief. We then called attention to the fact that that marked difference alone completely refuted the opinion of the lower court that the Wilson pronged type of underreamer body is the equivalent of the narrowly claimed hollow slotted extension type of the Double underreamer body.

It is interesting to note the reply of counsel for appellees to that highly convincing point of our defense. On page 190 of his reply brief he states:

“While it is true that the end portion of the
“Double reamer which forms the lower end
“of the slot 7 serves as a stop for the downward

“travel of the spring-actuated rod, key and cutters,
“so also does the cross-piece II or bottom bolt
“of the Wilson reamer.”

That is all the reply counsel could muster to our argument on that point which of itself is so strong and convincing as to completely negative any charge of infringement.

How can counsel hope to prevail in this case, when the meager and deceptive reply just noted is the only answer he can make to that highly important point? The answer he gives is not only evasive but is entirely false, as we will point out. Counsel's deliberate misrepresentation is one of the most flagrant which has come to our attention in all the litigation we have experienced in which counsel has opposed us. Counsel knows very well that the detachable cross-piece II or safety bolt of the Wilson underreamer body never contacts with the tee and that, consequently, it can in no wise form a stop for the *downward travel of the tee and the cutters*. Furthermore, counsel knows very well that the detachable cross-piece II of the Wilson reamer is for an entirely different purpose, viz., to prevent loss of the cutters in the hole in the event of breakage of the suspension means.

See the testimony of Williams, T. of R. p. 854:

“The purpose of the safety bolt in the Wilson reamer
“is to prevent the mandrel-bar (tee) from dropping
“out, in case the key should break, or the mandrel
“should break; prevents the cutters from dropping in
“the hole and losing them.”

(The “key” here referred to is the spring-supporting key of the Wilson Improved reamer.)

As we have previously pointed out, the Wilson underreamer was provided with entirely different means for limiting the downward travel of the cutters. See E. C. Wilson’s testimony, T. of R. p. 157:

“There being no slot in the Wilson underreamer “body for the suspension-means to travel in; consequently there is nothing for the suspension-means to “strike against, the downward compression of the “spring being limited, not by the lower extremity of the “key-slot, as in the case of the Double, as the Wilson “has no such key-slot, but the piece of pipe which is “placed over the tee-bar and underneath the spring. “This pipe is cut to such a length that when the spring “is compressed to the point desired, the pipe strikes “against the nut on the tee-bar and prevents the spring “from compressing any farther. This is a very different operation from that of the Double, as will be “noticed. Double has no such pipe in his underreamer “to stop this compression of the spring at the proper “place. He depends on the bottom of the key-slot.”

Your Honors will notice this pipe construction is to be seen on one or two of the tees of the Wilson underreamer, which are among the exhibits in this case. The pipe will be found in place underneath the springs on the tees.

Now, with the Wilson Improved underreamer, viz., the later type of Wilson underreamer, which has the slotted tee and the single piece key for holding the cutters in suspension in the reamer body, the upper end

of the slot in the tee striking on the stationary key serves as a stop, thus limiting the downward travel of the cutters. This is another entirely different means, as will be observed, for obtaining the desired result.

It is hard to conceive a more striking illustration of differences in construction, principles of action and modes of operation than those just indicated in connection with the slot 7 of the Double underreamer. Clearly the rule of Evans *et al.* v. Hall Printing Press Co., 223 Fed. p. 539, is precisely upon this point. We again quote therefrom:

“If the defendant omits one or more of the elements which make up the combination, he no longer uses the combination. It is no answer to assert that the omitted element was not essential and that the combination operates as well without as with them.”

To digress briefly we must remember that the Jones Round Nose reamer has all the features of the Double reamer excepting the slot 7 and the detachable key 17, guided and stopped thereby.

Their own expert, Griffin, admits that the Wilson underreamer has no such slot, and that such a slot is not necessary with the pronged type of underreamer. We have already indicated to Your Honors that not only do we dispense entirely with such slot 7 forming a guide for the key, one of the functions of the slot 7 of the Double underreamer, but for the other function, viz., the stop, we employ entirely different means. This point alone is another entirely adequate and sufficient point to establishing our contention that the pronged type of Wilson underreamer can in no wise be

held to be the mechanical equivalent of the hollow slotted type of the Double underreamer body.

Your Honors may remember the illustration which we have of the argument of this cause pertinent to the difference between the hollow slotted extension type reamer and the pronged type reamer. We called Your Honors' attention to the fact that Judge Cushman implies in the decision in this case that by building in a web the prongs of the Wilson reamer and providing it with a hollow and a slot the Wilson reamer can be made into the hollow slotted extension type of reamer. The illustration we used concerned a spade and a fork, and we pointed out to Your Honors that it was completely mechanically inconsistent to say that a spade is merely a fork with the space between the prongs or tines filled in, and that therefore the spade and fork are equivalents inasmuch as it is impossible to use the spade for prongs for which a fork is extended and vice versa. We likewise called Your Honors' attention to the confusion of the witness Griffin when asked to produce a sketch showing both the hollow and the slot, in different colored ink, and which he, for a long time, contended were both present in the Wilson fork reamer construction. Griffin and Knight, however, were forced to admit that these features, namely, the hollow and the slot, which are specifically defined and located and confined by metal in the Double hollow slotted extension, were only confined there in possible counterpart in a single open space between the prongs of the Wilson reamer. As we pointed out, it would only have been possible therefore for Griffin

to have so illustrated these two features in the Wilson reamer by making the inks of the two different colors.

Counsel for appellees has fallen into another serious trap set by himself, namely, that he has insisted both that the prongs of the Wilson reamer are the equivalents of the hollow slotted extension of the Double reamer and that the space between such prongs is the equivalent of such hollow slotted extension. Manifestly, inasmuch as things which are equal to the same thing are equal to each other, he forces himself to the assertion that the space between the Wilson prongs is the same thing as the Wilson prongs themselves. This illustrates the impossibility with which appellees are confronted in this case, namely, the impossibility of making out any rational condition of equivalence as applying to the elements of the Double patent claims and the features of the Wilson invention.

There are other sound reasons why the differences are so marked as to remove the Wilson reamer from any possible assumption that it is the mechanical equivalent of the Double hollow slotted type, among which is the fact that the Wilson underreamer prongs are provided, not with upwardly and inwardly inclined dovetails, as is the body of the Double underreamer, but with inwardly projecting parallel straight shoulders forming cutter-ways. There are no grooves or dovetails forming cutter-ways on the Wilson underreamer body. On the other hand, the cutter-ways of the Double underreamer are formed by planing grooves which are upwardly and inwardly inclined.

As Judge Cushman has held the dovetails of the Double underreamer body are so constructed that when

interengaged with the dovetails Double underreamer cutters, they form inner, outer and lateral bearings. Such is entirely impossible, as we have before indicated, with the Wilson underreamer, as they have no such "inner" bearings.

The inner bearings of the Wilson reamer for the cutters are on the tee and on the luge 2', neither of which elements is to be found in the Double reamers.

We firmly believe that Your Honors will give scant attention to any further contention of counsel for appellee that the pronged type of Wilson underreamer body is the equivalent of the Double hollow slotted extension type.

SUBDIVISION B OF DIVISION THREE OF OUR DIAGRAM
OF APPELLEE'S CASE:

We have before called attention to the fact that the straight and parallel cutter retaining shoulders, 2'', on the inner faces of the prongs of the Wilson underreamer body can in no wise be held to be the equivalents of the upwardly and inwardly inclined dovetails of the Double underreamer body. Their construction is entirely different, the dovetails of the Double body being produced by planing grooves, while with the Wilson reamer the retaining shoulders are projections and not grooves at all. In the case of the Double underreamer cutters. In fact, they permit the "tilting" of the Double underreamer cutters which, as is clearly indicated, is one of the absolutely necessary and essential features of the mode of operation of the Double underreamer cutters, and which causes or permits the cutters to collapse over the lower end of the hollow

slotted extension. Such a mode of operation is entirely impossible and cannot be produced by the straight and parallel retaining shoulders of the Wilson underreamer body. They in no wise cause or permit expansion or collapsion of the Wilson cutters. It is not only quite obvious that they cannot do so, but appellees' expert witnesses, Knight and Griffin, both admit that they can in no wise contribute to the collapsion or expansion of the Wilson underreamer cutters. See all testimony of expert W. W. Wilson, T. of R. p. 363:

"The Wilson underreamer is the only one the dovetails of which are solely for the purpose of holding the cutters in the reamer body. With the Swan and Double underreamers the dovetails on the reamer body perform a dual function, namely, retaining means and also expansion means."

Clearly appellees' contention that the retaining shoulders of the Wilson are the equivalent of the Double upwardly and inwardly inclined dovetails is absolutely fallacious.

AS TO SUBDIVISION C OF THE THIRD DIVISION OF OUR
DIAGRAM OF APPELLEES' CASE:

That the tapering or inclined bearings 9 on the lugs at the lower end of the prongs of the Wilson underreamer body can in nowise be held to be the equivalents of the opposite parallel bearing faces of the Double underreamer body, will be quite clear to Your Honors when it is remembered that, as we have pointed out above, the inclination of those bearings 9 performs a function of giving the cutters the initial collapsion and final expansion of the cutters. We have clearly pointed

out to Your Honors that the opposite parallel bearing faces of the hollow slotted extension of the Double underreamer body can in nowise produce collapsion or expansion of the cutters. True, these bearings form inner bearings for the cutters when in an expanded position as do the opposite parallel bearings of the Double hollow slotted extension, but instead of being opposite parallel bearing faces on the hollow slotted extension, or stationary wall or partition which is at all times interposed between the cutters, they are separated, spaced bearings at the ends of the prongs of the Wilson underreamer, and which expand the cutters in an entirely different way from the “abnormal” expansion occurring while the Double shoulders 18 ride over opposite parallel bearing faces of the Double underreamer extension 6, which “abnormal” expansion is due to the inclination of the dovetail cutter ways 9. They are so constructed and so interrelated with the bearings on the lateral shoulders of the Wilson underreamer cutters as to cause expansion and to *permit complete collapsion of the cutters between them* as the cutters are drawn downwardly. *They are entirely removed from between the cutters when the cutters are in a collapsed positions.* The differences between these bearings 9 on the lugs of the Wilson underreamer body and the opposite parallel bearing faces of the hollow slotted extension of the Double underreamer are very great indeed. Mechanical equivalency cannot possibly exist.

See the testimony of the appellee’s witness Griffin, wherein he points out that to remove the spreading

bearings of the Double reamer, leaving an open space as in the Wilson, the Double reamer would then be inoperative. T. of R. p. 642:

“With the ‘Defendant’s Exhibit Double underreamer’ and with ‘Complainant’s Exhibit Double Underreamer with Enlarged Slot’ should the spreading portion of the surfaces of the lower end of the body be removed such reamers would be entirely inoperative.”

AS TO SUBDIVISION d OF DIVISION THREE OF DIAGRAM:

The one-piece body of the Wilson underreamer, being of the pronged type, permits a mode of operation which is impossible with the Double, viz., that of assembling the cutters, tee and spring at the bottom of the reamer and between the prongs without the necessity of disengaging a middle joint in the reamer body (Wilson reamer body has no middle joint), which mode of operation differs entirely from that of the Double underreamer. Furthermore, this pronged construction of the Wilson underreamer body permits remachining of the Wilson underreamer body, another operation which is utterly impossible with the Double underreamer body. The pronged type of the Wilson underreamer body permits the use of heavier and stronger cutters, broader cutters and better braced cutters, and avoids the dangers of the middle joint.

It would be difficult to imagine two underreamer bodies having greater differences, more differences in principles of action and modes of operation, or one having more marked advantages over the other. The differences may be clearly discerned by even a casual

comparison of the Wilson underreamer with the Double underreamer. Clearly there is no mechanical equivalency existing there.

In order to support counsel's contention as set forth in our subdivision e, viz., that the open spaced pronged formation of the Wilson underreamer, or the space between the prongs, is the equivalent of the hollow and slot of the Double hollow slotted extension, we find counsel rising to the very zenith of his efforts to practice legerdemain. His efforts to accomplish this supernatural feat in his attempt to deceive the court by his dexterity is so amazing in its presumptuousness as to merit the special attention of Your Honors. Undoubtedly Your Honors have never before been confronted by such an amazing effort on the part of an attorney at law. WE FIND COUNSEL ACTUALLY ATTEMPTING TO CONVINCE YOUR HONORS THAT THE OPEN SPACE WHICH LIES BETWEEN THE PRONGS OF THE WILSON UNDERREAMER BODY IS BOTH HOLLOW AND SLOTTED. In other words, that that open space is equivalent in construction to those elements of the Double underreamer, consisting of the bore or hole drilled vertically to accommodate the spring actuated rod, and the slot 7, which serves as a guide for the detachable notched key, and also serves as a stop for the key, and the opposite parallel bearing faces for the cutters.

We invite Your Honors to pause and consider how presumptuous and how preposterous are counsel's efforts in this regard.

Probably never before has an attorney presumed on the intelligence of a federal court to such an extent as to endeavor to convince them that a certain open

space or cavity or void can be hollow or slotted, much less to be both hollow and slotted; or that such a space could in any sense be the equivalent of a key-way or slot which forms a guide for a key which moves vertically therein, or forms a stop for a key to limit its travel one way or the other; or that such an open space could be regarded as being hollow in the same sense that a hole drilled in a piece of metal is hollow to form an opening or a guide for a spring actuated rod; or that such open space between the prongs of the Wilson underreamer can in any sense be held to be the equivalent of the hollow slotted extension, having opposite parallel bearing faces upon which the cutters of such underreamer can be expanded and held in expanded position while reaming. Yet, Your Honors, that is precisely what counsel would have Your Honors believe.

True, counsel endeavors to so confuse the minds of this court by juggling the element 7, namely, the slot of the Double underreamer (and Your Honors will observe that there is no other slot mentioned in either the specifications of the Double underreamer patent or the claims thereof) with the open dovetailed slipways 9 of the Double underreamer patent, that our Honors will be unable to disassociate the one from the other; and that what is clearly described in the Double underreamer patent as "upwardly and inwardly sloping, tapering dovetailed slipways 9" will finally appear to Your Honors as taking the shape and function of a slot, and will finally be so regarded by Your Honors.

Of course such a juggling by counsel of the elements clearly described by the Double patent in his efforts to accomplish his purpose will be given slight heed by Your Honors.

Why does counsel resort to such unseemly practice? Why does he so boldly attempt to practice such deception before a court of such dignity?

The reasons are clear: Counsel is trying to sustain the decision to which he was never entitled. He resorted to the same absurdities when arguing before Judge Cushman, but unfortunately His Honor (for whom, and from whose judicial ability, we have the highest respect) had not had the patent law experience necessary to fortify him against such unscrupulous methods. Counsel having successfully urged such fallacies before the lower court, and knowing that Judge Cushman's decision was founded thereon, knows full well that he must establish his same fallacious contentions before this court or his case of necessity must fail.

The hollow slotted extension 6 of the Double underreamer is one of its very chief and most essential elements, and if the Wilson underreamer cannot be shown to have the same elements or their equivalents, the charge of infringement must inevitably fail.

Thus, in desperation, counsel is obliged to urge the preposterous fallacies of which his entire case is constructed.

Therefore, counsel's efforts as set forth in our subdivision *e* must be regarded as simply frantic attempts to establish equivalence where none exists.

AS TO SUBDIVISION f OF DIVISION THREE:

We have repeatedly so clearly pointed out the differences in the principles of action and modes of operation produced by the two lugs 2' at the ends of the prongs of the Wilson underreamer body with their inclined faces 9, from those of the opposite parallel bearing faces of the extension 6 of the Double underreamer, that we think nothing need be said further in order to convince Your Honors that those lugs 2' cannot possibly be held to be the equivalent of the hollow slotted extension 6 with opposite parallel bearing faces, of the Double underreamer body.

AS TO DIVISION g OF DIVISION THREE:

The detachable block of the Wilson underreamer body which serves as a seat for the spring, and also the removable key of the Wilson improved underreamer, which performs the same service, are each a very different device from the shoulder 5 of the Double underreamer body. True, they form a seat for the spring, but they do so in an entirely different manner, being detachable, which of itself totally changes the mode of operation, providing the new and only satisfactory method of assembling a reamer, and also permitting renewal of wornout reamers which theretofore was impossible with any kind of reamer. In fact, so important was this removable spring seat feature considered by appellee corporation that it eliminated the fixed shoulder 5 from the Double underreamer, and in their infringing type F reamer in case No. 2918 we find this single piece key spring seat which was the key of the litigation in *Wilson et al. v. Double et*

al., 227 Fed. 607, previously referred to. So important was that change that separate patents were issued upon the combination including the same, one to Wilson and one to Double and Bole; the latter patent, after the above-mentioned litigation, having been declared void because Bole and Double surreptitiously obtained the same. The detachable and the removable spring seat are certainly not like the Double shoulders 5 in construction. In fact, they are so different as to entirely differentiate them from the Double shoulder 5, nor can they be held to be mechanical equivalents of that shoulder.

AS TO SUBDIVISION h OF DIVISION THREE:

We need say nothing more, we fully believe, to convince Your Honors that the Wilson shanked cutters, having shoulders projecting laterally and with bearing faces thereon to co-act with the lugs of the Wilson underreamer body, and which swing pendulum-like on the solid forged Tee instead of "tilting" upon a loose, detachable key, and which collapse completely between the prongs and lugs of the reamer body instead of "teetering" over a hollow slotted extension, and which have no inwardly projecting shoulders like 18 of the Double underreamer cutters, and which have no V-shaped grooves across the backs of the cutters, are so radically different in construction and so different in their mode of operation as to be entirely beyond the scope of the Double underreamer patent, even were it proper to invoke the aid of the most liberal allowance of the Doctrine of Equivalents. Their expert witness Griffin admits that there are no V-shaped grooves

across the backs of the Wilson cutters, yet we need not rely on such admission as the exhibits of the Wilson cutters speak for themselves in that regard.

In fact Griffin states positively that the V-shaped groove or recess at the back of the Double cutters are the very means for causing expansion of the Double cutters. This V-shaped groove is produced by the inclined face 26 of the cutter.

See Griffin's testimony, T. of R. p. 112:

"I have never seen the Double cutter that did not have a *recess on the inner face for the purpose of CAUSING EXPANSION of the cutters.*

I do not find such formation in the Wilson cutters.
* * * The expansion of the Wilson underreamer cutters takes place by the cutters engaging the narrow side spaces or edges of the prongs, while with the Double underreamer this expansion takes place by engaging the cutters with the broader faces of the intermediate slotted extension."

In fact, all the differences in construction of the Wilson underreamer when compared with the Double underreamer are so obvious and so absolutely apparent to anyone even of very slight knowledge of mechanics that we often wonder why we should burden Your Honors with a lengthy discussion of such apparent differences in construction and interrelation of parts, principles of action and modes of operation, when such can be determined by Your Honors by simply a casual glance at the exhibits or at the patents. We are firmly convinced that by far the greater portion of the contentions of counsel for appellee in argument and in

briefs as well as a large portion of our argument and briefs in reply thereto will be promptly disposed of by Your Honors as being so lacking in importance as to require none of Your Honors' attention. Your Honors will promptly seek out the differences in construction as disclosed by the exhibits themselves and by the patents and specifications thereof, and no doubt will promptly perceive that the Wilson underreamer is a radical departure, both in construction and interrelation of elements and principles of action and modes of operation from any underreamer which preceded it; and that the Double underreamer patent, even allowing it the most liberal application of the Doctrine of Equivalents, cannot possibly be infringed by the Wilson underreamer.

AS TO SUBDIVISION i OF DIVISION THREE:

That the solid forged Tee of the Wilson underreamer is a radically different device from the slotted rod and detachable notched key of the Double underreamer is, of course, strikingly apparent. True, they both suspend the cutters in the reamer body; nevertheless, it is equally true that the modes of assembling the cutters in the reamer body is a vastly different operation by reason of the differences in construction and principles of action of those two devices. It would be utterly impossible to use the solid forged Tee of the Wilson underreamer in a Double underreamer body. It could not possibly be assembled in that body, which of course must be very apparent to Your Honors.

See testimony of appellee's expert witness Knight, T. of R. p. 810:

“If you had a fixed T-head at the lower end of the spring-actuated rod of the Double underreamer, you could not assemble the spring-actuated rod and cutters in the manner disclosed in the Double patent.”

Counsel’s contention that the Wilson solid forged Tee is the equivalent of the notched key and slotted rod is simply another one of his fallacies.

AS TO SUBDIVISION j OF DIVISION THREE:

That the principle of action and mode of operation of the Wilson cutters mounted upon the solid Tee, and swinging “pendulum-like” when they collapse or expand between the prongs of the Wilson underreamer are entirely different from that of the Double underreamer cutters, which tilt or slide upon the notched key while they are being collapsed or expanded over a stationary wall or partition, viz., the hollow slotted extension 6, which at all times is interposed between the cutters; and which cutters are partially collapsed or expanded by means of the upwardly and inwardly inclined dovetailed slipways,—such differences, we say, are altogether too obvious to require any further discussion. No stretching of the rule of the Doctrine of Equivalents can cover up the fact that their constructions are entirely different, that different results are produced, and that such different results are produced by different principles of action.

See testimony of expert witness W. W. Wilson, T. of R. p. 360:

“In expanding the Wilson underreamer cutters their sole means of expansion is the inclined faces or spread-

ing bearings at the lower ends of the prongs of the reamer body. With the Double underreamers the cutters are expanded partly by the spreading wall or partition, namely, the lower end of the hollow slotted extension, and partly by the teetering action of the cutter on that partition due to the upper end of the cutter following the upwardly and inwardly inclined dove-tailed ways."

Hence, they cannot possibly be held to be mechanical equivalents.

AS TO SUBDIVISION k OF DIVISION THREE:

As just pointed out above, the initial collapsing of the Wilson underreamer cutters by co-acting with the inclined bearing faces 9 on the lugs of the Wilson underreamer body can in nowise be regarded as the equivalent of the principle of action and mode of operation of the Double underreamer cutter. The constructions are radically different, the means for collapsing and expanding the cutters as well as the modes of operation resulting therefrom are so obviously different from that of the tilting cutters of the Double underreamer as to require no further argument to convince Your Honors that counsel's contentions in that regard are entirely erroneous and misleading.

AS TO SUBDIVISION l OF DIVISION THREE:

That the detachable cross piece or safety bolt 11 of the Wilson underreamer prongs can in nowise serve as a stop for the downward travel of the cutters has been clearly pointed out before in this brief, and also in our opening brief. The safety bolt or detachable

cross piece can in nowise be considered the equivalent of the bottom of the slot 7 of the Double underreamer. Counsel's contention in that regard is a wilful misrepresentation. He knows full well that that safety bolt or detachable cross piece 11 of the Wilson underreamer body performs an entirely different function, viz., *that of a safety device for preventing the loss of the cutters in the event of breakage*, say, to the Tee; and that, furthermore, *he knows full well that that detachable cross piece 11 of the Wilson underreamer body cannot possibly contact with the Tee unless such a breakage would occur*. Therefore, he knows that he misstates the facts in the argument he advances that it is the equivalent of the bottom of the slot 7 of the Double underreamer. Furthermore, he knows full well that other means are provided in the Wilson underreamer for limiting the downward travel of the cutters. Such means he knows to be the pipe so adjusted on the T-bar and underneath the spring as to limit the compression of the spring and, in turn, limiting the downward travel of the cutters. He also knows that in the Wilson improved underreamer the top of the slot in the Tee co-acting with the stationary key performs that function. Counsel's attempt to deceive Your Honors in this regard is strikingly apparent.

AS TO SUBDIVISION 11 OF DIVISION THREE:

The retaining shoulders 2" on the inner faces of the prongs of the Wilson underreamer body are for simply one purpose, viz., they retain or hold the cutters in place upon the Tee. They perform no part whatever in the expansion or contraction of the Wilson cutters.

In nowise can they form "inner bearings" as do the dovetails of the Double underreamer. Judge Cushman's failure to fully understand the function of these retaining shoulders on the inner faces of the prongs of the Wilson underreamer body led him into the error of finding that they were the equivalent of the dovetails of the Double underreamer in that, as he states in his opinion, "they form *inner, outer and lateral bearings.*" The interengagement of these retaining shoulders on the prongs of the Wilson underreamer body with the shoulders on the shanks of the Wilson underreamer cutters can, under no circumstances whatever, produce such an interengagement as to form "inner, outer and lateral bearings." *They may form outer and lateral bearings but not inner bearings.* They are not alike either in form or in modes of operation. They cannot possibly be the equivalents of the dovetails of the Double underreamer.

IN REPLY TO SUBDIVISION 11 OF DIVISION THREE:

The only elements or combination of elements of the Wilson underreamer which are in common with the Double underreamer are such as those which might be expressed in very broad terms; such as the hollow body or mandrel; the spring actuated cutter suspension-means; and cutters expanding over spreading-bearings; The prior art precludes Double or anyone else from monopolizing such constructions. Any monopolies obtainable must be limited to the particular changes or the particular interrelation of parts or the combinations thereof and the modes of operation produced thereby, and which may be the subject of a pat-

ent. The rule of the Doctrine of Equivalents cannot possibly suffice to grant the Double patent any monopoly beyond the particular combination of elements claimed therein, even granting that Double be the inventor of the reamer of that patent and that the Double patent in suit is valid or that it is unanticipated by the Jones round-nosed reamer, the O'Donnell and Willard underreamer, the Brown underreamer, the Swan underreamer and many others

AS TO THE FOURTH DIVISION :

In view of the conclusive proof that there is not one single feature disclosed by the Double patent in suit, much less any combination of such features or elements covered by that patent, which has a counterpart in the Wilson underreamer, *and that not one single equivalent for any such element or combinations thereof is to be found in the Wilson underreamer* as shown above; and furthermore, in view of the extremely narrow scope to which the limited claims of the Double patent must necessarily be confined; and further, in view of the radically different and novel construction and operation of the Wilson underreamer; its vastly superior construction and great improvement in the art, its general adoption, and the complete abandonment of the Double underreamer covered by patent in suit, it must be quite clear to Your Honors that *there is not one syllable of authority to be found in the entire subject of patent law which will support the decision of the lower court.*

Certainly the Doctrine of Equivalents cannot be so distorted and so perverted as to give sufficient scope to the Double patent that it may include the new and radically different patented Wilson pronged type of reamer.

Having thus pointed out to Your Honors that the several essential and fundamental elements of the Double combination are not to be found in the Wilson reamer, nor are any of the Wilson elements even remotely equivalent to those of the Double reamer, and, having such in mind, Your Honors will perceive how farcial are counsel's efforts in endeavoring to read the claims of the Double patent on the totally different structure of the Wilson reamer. Also, the biased and absurdly exaggerated statements of appellees' main witnesses, Griffin and Knight, appear doubly ludicrous and false. Obviously their testimony is a parrot-like recital of preposterous expressions taught them by counsel for appellees, and frequently is contrary to the facts. We are constrained to say, "the truth is not in them."

We wish at this point to briefly quote from and cite leading and apt authorities, gleaned from the mass of the law as it stands today, supporting our points and contentions on this appeal.

Much has been said regarding the absolutely limiting language of the Double patent in suit pertinent to the opposite parallel bearing faces of the hollow slotted extension 6. We find the same limitation as to parallel relations in *O'Brien-Worthen Co. v. Stempel*, 209 Fed. 847, from which we quote the following:

“Two amendments of the new claim were, however, exacted and made before the examiner appears to have been satisfied that it was in correspondence with the features just pointed out. The first amendment of the new claim required that the side walls of the cargo hold should be vertical and parallel, not merely part of their length, but ‘throughout their entire length,’ and the second one required that the side walls should be ‘unobstructed from bottom to top.’ When these amendments are read in connection with the first amended claim, it will be seen in the first place that the shape of the new hold is defined with exceptional clearness and imperative exaction. It must be a ‘central longitudinal trunk’ extending ‘from front to rear,’ with ‘vertical side walls parallel throughout their entire length.’ ”

Continuing further, the court said:

“These latter requirements, like the others, were based on references to specified patents. These, in the judgment of the examiner, like the Shone patent in the first instance, were sufficient to warrant his rejections, and the effect was to induce Campbell to meet them with satisfactory amendments. It is not necessary to examine those patents with any purpose either of defining the prior art or of otherwise justifying the action of the patent office. It is sufficient that Campbell acquiesced in the rulings, instead of taking the prescribed course of appeal.”

In the same connection as to the absolutely limiting language of the Double patent, see:

Safety Oiler Co. v. Scoville, 110 Fed. 203, 205;
Brill v. St. Louis Car Co. (C. C. A., 8th Cir.),
90 Fed. 666, 668;

American Stove Co. v. Cleveland Foundry Co.
(C. C. A., 6th Cir.), 158 Fed. 978, 983;
Morgan Envelope Co. v. Albany Paper Co., 152
U. S. 425, 429.

We further quote from the recent case of Thatcher v. Transit Const. Co., 228 Fed., at page 906 *et seq.*, as follows:

“Furthermore, the patentee must be presumed to have meant what he said. He has described a particular construction and in his claim he has stated that it is this particular construction upon which he desired to secure a monopoly. Such self-imposed limitations are always recognized precluding a patentee from showing that the invention is broader than his claims, and, if broader, he must be deemed to have surrendered the surplus to the public. Railroad Company v. Mellon, 104 U. S. 112, 119, 26 L. Ed. 639; White v. Dunbar, 119 U. S. 47, 51, 52, 7 Sup. Ct. 72, 30 L. Ed. 303; McClain v. Ortmyer, 141 U. S. 419, 12 Sup. Ct. 76, 35 L. Ed. 800. This proposition was clearly stated in White v. Dunbar, *supra*, where the court said:”

In White v. Dunbar, *supra*, the court said:

“Some persons seem to suppose that a claim in a patent is like a nose of wax, which may be turned and twisted in any direction, by merely referring to the specification, so as to make it include something more than, or something different from, what its words express. The context may undoubtedly be resorted to, and often is resorted to, for the purpose of better understanding of the meaning of the claim but not for the purpose of changing it, and making it different

from what it is. The claim is a statutory requirement, prescribed for the very purpose of making the patentee define precise what his invention is; and it is unjust to the public, as well as an evasion of the law, to construe it in a manner different from the plain import of its terms."

"The meaning of the words 'each pair of a bar being independent of the other' is not doubtful, and there is nothing in the case which justifies its being expunged from the claims. *Brookfield v. Elmer Glass Works*, 154 Fed. 197, 83 C. C. A. 180. Tested by these well-settled rules of construction, the ultimate question is, in the defendant's structure upon which the charge of infringement is predicated, are the bars independent of each other? In my opinion, they are not, and, if they are not, the patent is not infringed."

That the Double patent covers merely a trivial improvement and is not in any sense pioneer, in view of the prior art and on the face of the patent itself, see *McCormick v. Talcott*, 20 Howard 402. Also the important case of *Railway Co. v. Sayles*, 97 U. S. 554, in which the court says that the party who invents a machine never used before, acquires by his patent a monopoly as against all merely formal variations thereof; but if the advance toward the thing desired is gradual, and proceeds step by step, each inventor is entitled only to his specific form of device. From the opinion we quote:

"Like almost all other inventions, that of double brakes came when, in the progress of mechanical improvements, it was needed; and being sought by many minds, it is not wonderful that it was developed in different and independent forms, all

original, and yet all bearing a somewhat general resemblance to each other. In such cases, if one inventor precedes all the rest, and strikes out something which includes and underlies all that they produce, he acquires a monopoly, and subjects them to tribute. But if the advance toward the thing desired is gradual, and proceeds step by step, so that no one can claim the complete whole, then each is entitled only to the specific form of device which he produces, and every other inventor is entitled to his own specific form, so long as it differs from those of his competitors, and does not include theirs. These general principles are so obvious, that they need no argument or illustration to support them. We think they are specifically applicable to the case before us."

Regarding the Jones round-nosed reamer and other devices not before the patent office, Hopkins on Patents, Vol. I, page 28, section 13, says:

"Where the history of the application for the patent shows that the patent office did not refer to and consider the references which are urged against the validity of the patent in litigation, the court must determine the weight and effect to be given such references, as a matter of first impression, and the failure of the patent office to cite such references may wipe out the ordinary presumption of validity attendant upon the grant."

Walker says in section 340:

"Any person may accomplish the result performed by a patented thing without infringing the patent, if he uses means substantially different from those of the patent. To hold the contrary of this rule would be to retard, and not to promote the progress of the useful arts."

Also Robinson on Patents, section 527, says:

“A claim for a combination covers the exact combination claimed, and nothing more. It does not protect the elements of the combination nor their mode of union, nor their co-operative law, separately considered. It does not embrace any other union of the same elements with each other, or with additional elements, nor a combination of a portion of these elements among themselves. Where it omits certain elements, it excludes them from the combination, though they are in fact essential to it as an operative means; and where it treats certain elements as necessary they cannot afterwards be declared by the inventor to be unnecessary, although the real invention was complete without them.”

If the Double invention was complete without limitation to hollow slotted extension, upwardly and inwardly sloping dovetail ways, and inwardly projecting shoulders on the cutters, etc., etc., why were all of such limiting elements put in the claims? The answer is, that these elements all taken together are what Double put before the patent office as his invention. Thus his invention is not found in the defendant's reamer.

Mere results are not patentable, as see Hopkins on Patents, Vol. 1, section 39, at page 80, in which it is said, quoting from *Fuller v. Yentzer*, 94 U. S. 288:

“Patents for a machine will not be sustained if the claim is for a result, the established rule being that the invention, if any, within the meaning of the patent act, consists in the means or apparatus by which the result is obtained.”

And further on:

“The question of identity of result is an important factor in the determination of questions of infringement, but as results are not patentable, there may be identity of result without the existence of infringement as identity of result is no evidence of infringement unless substantially the same means operating in substantially the same way, have been employed.”

Also see Walker on Patents, section 340, which states as follows:

“The respective results of a machine or manufacture covered by the claim of a patent, and of a machine or manufacture alleged to infringe that claim, do not furnish a criterion by which to decide the question of infringement. (Citing *Westinghouse v. Boyden Power-Brake Co.*, 170 U. S. 562.) Those results may be identical while the things which produce them are substantially different. Any person may accomplish the result performed by a patented thing without infringing the patent, if he uses means substantially different from those of the patent. To hold the contrary of this rule would be to retard, and not to promote the progress of the useful arts.”

See also section 341, Walker on Patents, as to mode of operation and its relation to determining infringement.

That Double could not be the inventor of what he did not invent, and that therefore that Jones should have been applicant or joint applicant for the patent in suit and that the patent is invalid, Walker on Patents, section 46, says:

“Every machine, before it can be used, must be constructed as well as invented. If one man does all the inventing and another does all the constructing, the first is the sole inventor.”

Also see *Quincey Mining Co. v. Krause et al.*, 151 Fed. 1012, to the effect that (page 1017):

“If a claim covered a single idea, it would be difficult to conceive how it could be patented by two; but, when a claim covers a series of steps or a number of elements in a combination, the invention may well be joint, though some of the steps or some of the elements may have come as the thought of but one.”

See also *Consolidated Bunting Apparatus Co. v. Woerle*, 29 Fed., at page 451:

“It may be that the conception of the entire device is due to but one of them; but the other makes a suggestion of practical value in working out the idea, and making it operative. But that suggestion may be the very thing the first one failed to think of, and it was needed to make the conception a success.”

As supporting our contention that it was the Wilson reamer which kept the Double reamer in the field after the advent of the Wilson, it was said in *Star Hame Mfg. Co. v. United States Hame Co.*, 227 Fed., page 883 (C. C. A.):

“In reaching this conclusion we are not unmindful of the insistence that the favor with which plaintiff’s hame device was received in the market tends to show invention. While such favor is in some instances helpful and persuasive, it never is where the device is clearly lacking in the attri-

bute of invention (Autosales Gum & Chocolate Co. v. Caille Bros. Co., 224 Fed. 473, 476—C. C. A.—(C. C. A., 6th Cir.) and further, as we have seen, the device of the present plaintiff included the Shurghnor patented improvement, as well as the supposed equivalent of the spring which the patent in suit added to Shurghnor, and hence the sales shown have slight relevancy to the question of invention. It follows that the claims of the patent in suit are invalid and void. The decree must be reversed in each cause, and the causes remanded, with costs, and with direction to dismiss both bills.”

Because of limitation by the prior art this court in *Morton v. Llewellyn*, 164 Fed. 693, found no infringement, counsel for appellees in the case at bar being there counsel for the losing patentee.

Further as to the controlling propriety of narrowly construing the Double patent in suit, see:

Cimiotti Unhairing Co. v. American Fur Refining Co., 198 U. S. 399;

Reineke et al. v. Dixon-Woods Co., 102 Fed. 349;

Westinghouse Electric & Manufacturing Co. v. Condit Electrical Mfg. Co., 159 Fed. 150;

Union Steam Pump Co. v. Battle Creek Steam Pump Co. et al., 104 Fed. 344 (C. C. A.).

See *Robinson on Patents*, Vol. 1, p. 228, as follows:

“A combination is a union of elemental means in a mode of co-operation; and, as such, it necessarily performs functions into which all its elements enter as operative agents, and produces results which depend upon the presence and action

of every one of the elements combined. * * * The identity of a combination depends upon that of its elemental means and that of the co-operative law under which its elements are united; any substantial change in either means or law destroying its identity and resulting in the final segregation of the elements or in a new and wholly different combination. * * * A patented combination is the combination described and claimed in the patent, i. e., it is composed of the described elements co-acting under the described co-operative law, whether or not such description accurately enumerates the true elements or sets forth the real mode of their co-operation."

"A combination is a group of instruments or operations united under a co-operative law. Its identity depends upon the presence in the combination of each one of these elements or its equivalent, and upon their co-operation in this specific manner to produce the ultimate result. Hence any change in the number of its elements, or in their essential character, or in their mode of co-operation, is a departure from the substance of the combination, and constitutes a different invention. A patented combination is the combination described and claimed in the patent which protects it. Of whatever elements it may actually be composed and whatever may be the method of their union as the inventor conceived and practices his invention, the elements specified in the patent, and the co-operative law there described, are those which characterize the patented combination and form the subject of the exclusive privileges of the patentee. The infringement of a combination patent, therefore, consists in the manufacture, use, or sale of any combination in which

precisely the same elements or their equivalents are united under the same co-operative law. To make or use or sell a combination in which the same elements are differently combined, or a combination which comprises only a portion of these elements, though the discarded elements are practically useless, and though the combination thus created was suggested by the former, is not an infringement."

Rich v. Baldwin, Tuthill & Bolton, 133 Fed. 923 (C. C. A.);

Duncan *et al.* v. Cincinnati Butchers' Supply Co. *et al.*, 171 Fed. 665 (C. C. A.).

So, in Russell v. Winchester Repeating Arms Co., 148 Fed. 390:

"The law is settled that the combination of an alleged infringing device is not that of the patent because it will do the same work in one of the several operations which it is designed to effect in substantially the same way, and it does not infringe when it is not only structurally different, but performs the other operations in a substantially different way. Is not the complainant in worse plight when the alleged infringing device is not only structurally different, but does not perform by reason of its combination various functions which are inherent necessities of the patented combination, and have been specifically pointed out in the specifications? In short, the 'brace' of the disclosure cannot be found in defendant's construction."

American Can Co. v. McGinnis *et al.*, 156 Fed. 785;

Westinghouse Air Brake Co. v. New York Air Brake Co., 119 Fed. 884 (C. C. A.).

As was said in *White v. Dunbar*, 119 U. S. 47, 7 Sup. Ct. 72, 30 L. Ed. 303:

“It is an injustice to the public, as well as an invasion of the law, to construe it (the claim) in any manner different from the plain import of its words.”

“The fourth claim is not infringed.”

Henry Huber Co. v. J. L. Mott Iron Works,
113 Fed. 604;

*American Chocolate Machinery Co. v. Helms-
stetter*, 1442 Fed. 982 (C. C. A.).

and, again, in *Wessel v. United Mattress Mach. Co.*,
139 Fed. 15 (C. C. A.):

“It is a well settled rule, often repeated in varying forms of expression, that where two inventors improve an old machine, each is entitled to the benefit of his own improvement, so long as it differs from that of the other, and does not include his. In the present case the improvements differ completely. Only in the result accomplished is there any similarity.”

*Dey Time Register Co. v. The Syracuse Time
Recorder Co.*, 152 Fed. 442;

Central Foundry Co. v. Coughlin, 141 Fed. 95
(C. C. A.).

In *Collins v. Dunlap & Co.*, 180 Fed. 776:

“It is quite apparent from this quotation that the ‘collar’ is an element of each of these claims. Inspection of the alleged infringing article shows that it does not contain the ‘collar’ of the patentee.

“The motion for preliminary injunction is denied.”

Consolidated Store-Service Co. v. Siegel-Cooper Co. *et al.*, 103 Fed. 489.

That the Wilson reamer is a distinct entity, the issue of the patent amounting to recognition that such different entity exists, is borne out in Imperial Bottle Cap & Machine Co. v. Crown Cork & Seal Co., 139 Fed., at page 329, from which opinion we quote as follows:

“In sustaining the validity of Painter’s patent, we referred to the principle, which is well settled, that the grant of a patent is *prima facie* evidence of patentable novelty. The same principle may be invoked in behalf of defendants. Painter’s patent is specifically referred to in Abbott’s application, and the patent office had before it Painter’s and all the other patents showing the state of the art when the patent was granted. It was designed to accomplish the same functions as Painter’s, and on its face it discloses and claims a substantial difference, and could not have been consistently granted if it were substantially the same as Painter’s. The grant of it therefore must be considered as expert evidence, of high and impartial character, of non-identity, and raises a fair presumption of patentable difference in its favor, which requires strong evidence to overcome. We are not satisfied that the plaintiffs have succeeded in so doing, and, in our opinion, there has been no infringement.

“It follows, therefore, that the judgment of the court below should be reversed, and the case remanded, with directions to dismiss the bill.

“Reversed ”

Further as to the limited scope of the Double patent see *Werner v. King*, 96 U. S. 218, in which it was said:

“It is not only necessary to an infringement that the arrangement which infringes should perform the same service, or produce the same effect, but, as Mr. Justice Nelson said in *Sickles v. Borden* (3 Blatchf. 355), it must be done in substantially the same way. *Burr v. Duryea*, 1 Wall. 531.”

“The difference in the shape or form of the guides in these machines is not the only one. They operate on entirely different principles.”

Again on this pioneership question see *Union Match Co. v. Diamond Match Co.*, 162 Fed. 148, at page 155.

See also:

Kokomo Fence Machine Co. v. Kitselman, 189 U. S. 8;

National Hollow Brake Beam Co. et al. v. Interchangeable Brake Beam Co., 106 Fed. 693;

O. H. Jewel Filter Co. v. Jackson, 72 C. C. A. 304, 140 Fed. 340;

Mahoney v. Jenkins et al., 138 Fed. 404.

Also, it was said in *Duff Mfg. Co. v. Forgie*, 59 Fed. 774, 8 C. C. A. 261:

“Language by which the comprehensive boundaries of a claim are to be made distinctive and clear lies wholly within the selection of the inventor. He alone may choose the words to describe and particularize his invention. When chosen and used, such words must be held to be binding upon him.”

The court says further:

“In a combination patent all the elements are material. *Water Meter Co. v. Desper*, 191 U. S. 337.”

That the Jones round-nosed reamer must anticipate, inasmuch as counsel notified Jones that it infringed, see *Peerless Rubber Mfg. Co. v. White*, 118 Fed. 835 (C. C. A.):

“It is a well established rule that ‘that which infringes, if later, would anticipate, if earlier’; and, conversely, that a device cannot be held to be an infringement unless it would have been held, if used earlier than the patent, to have been an anticipation thereof. *Tobacco Co. v. Streat*, 28 C. C. A. 18, 83 Fed. 700.”

Counsel has so exhaustively argued and cited authorities in his briefs for appellee in cause No. 2918, as to the kind of things he calls abandoned experiments in this case when dealing even with such patented things as the O'Donnell and Willard reamer and the Brown reamer, that we believe Your Honors will be convinced that his arguments in this case cannot be sincere when directed against these prior devices, preceding the Double reamer, and actually within the real prior art. Clearly, patented devices can hardly be abandoned experiments.

That there was no real invention in the Double reamer over the Jones round-nosed reamer fully known to Double before his alleged invention of the device of the patent in suit, see *Apple v. American Shoe Machinery & Tool Co.*, 232 Fed., at page 606, in which the court said:

“Putting the Hoffman patent in its most favorable light, it is very little, if anything, more than an aggregation of prior well-known devices, each constituent of which aggregation performs its own appropriate function in the old way. Where a combination of old devices produces a new result such combination is doubtless patentable; but where the combination is not only of old elements, but of old results, and no new function is evolved from such combination, it falls within the rulings of this court in *Hailes v. Van Wormer*, 20 Wall. 353, 368 (22 L. Ed. 241); *Reckendorfer v. Faber*, 92 U. S. 347, 356 (23 L. Ed. 719); *Phillips v. Detroit*, 111 U. S. 604 (4 Sup. Ct. 580, 28 L. Ed. 532); *Brinkerhoff v. Aloe*, 146 U. S. 515, 517 (13 Sup. Ct. 321, 36 L. Ed. 1068); *Palmer v. Corning*, 156 U. S. 342, 345 (15 Sup. Ct. 381, 39 L. Ed. 445); *Richards v. Chase Elevator Co.*, 158 U. S. 299 (15 Sup. Ct. 831, 39 L. Ed. 991). Hoffman may have succeeded in producing a shelf more convenient and more salable than any which preceded it, but he has done it principally, if not wholly, by the exercise of mechanical skill.”

In this connection the other prior devices are also to be borne in mind, and the court's attention is drawn to *Marshall v. Wirt*, 232 Fed., third paragraph, page 608.

See also third paragraph, 232 Fed., at page 869, *Zimmerman v. Advance Machinery Co.*

Judge Wolverton of this Circuit Court has ably discussed the question of infringement of a narrow combination patent in *Denny Renton Clay and Coal Co. v. Portland Cement Pipe & Tile Co. et al.*, 232 Fed. at page 894.

That mere mechanical improvements are often devoid of invention and not patentable, see *syllabi Hansen v. Slick*, 230 Fed. 627.

In this connection, and particularly with respect to the Jones round-nosed reamer, see *Keene v. New Idea Spreader Co.*, 231 Fed., fifth paragraph, at page 710.

Wilson made a new combination of elements, and the same having a different mode of operation from Double, cannot infringe, as within the language of *Klauber-Weldon Dyeing Mach. Co. v. Giles et al.*, 231 Fed., second paragraph, at page 755, which we quote as follows:

“It is clear, I think, that Giles made a new combination of old elements, and that, while he produces the same result as does complainant, he does not have the same combination of elements, or a combination made up in part of equivalents differently located, or elements changed in form and construction merely. There is not sufficient identity in the performance of their functions between the elements of the two machines. I am constrained to the conclusion that defendants do not infringe.”

That claims in patents for minor improvements in an art already well understood should be strictly construed, see

American Graphophone Co. v. American Parlo-graph Corp., 235 Fed. p. 137.

We believe this case falls clearly within the healthy doctrine announced by the court in *Lovell-M'Connell Mfg. Co. v. Oriental Rubber & Supply Co.*, 231 Fed. 719, at page 725:

“No attempt to ruin a competitor’s business or to drive it out of the market by malicious or unfair and unlawful dealings can hope to succeed in a court of justice. No court will be astute to aid an enterprising patentee in an undertaking of that sort. We do not intend to reflect upon the conduct of the particular patentee in the case at bar. He has done nothing unlawful. And we have no evidence that his conduct has been malicious. But a patent issued under the circumstances which attended the issuance of this one, and indeed any patent the validity of which is challenged, will be closely scrutinized for the protection of the public against a monopoly not authorized by the law. The patent in suit fails in this case, as did the prior patents in *Lovell-McConnell Mfg. Co. v. Garland Automobile Co.*, *supra*, because of lack of invention.

“Decree reversed.”

Finally, we know of no better way to describe and characterize the conduct and presumptuous contentions of appellees and their counsel in this cause than to quote the language of the Honorable Learned Hand, district judge in the Southern District of New York, in *DeLaski & Thropp Circular Woven Tire Co. et al. v. United States Tire Co.*, 232 Fed. 884, at page 887, as follows:

“MEN’S LIVES AND LIBERTY DEPEND UPON NO SUCH METICULOUS CASUISTRY AS IS OFTEN INVOKED TO SAVE A PATENT, AND I CAN SEE NO SUPREME PUBLIC INTEREST IN SUBJECTING AN ART TO THE MONOPOLY OF A SUPPOSED FIRST INVENTOR, BY THE EXERCISE OF PERVERSE AND ARBITRARY INGENUITY TO PUT ASKEW ALL REASONABLE PROOF THAT OTHERS HAVE COME INTO THE FIELD BEFORE HIM.”

Counsel would have it that letters patent should be issued with a frank or "carte blanche" appendix to the grant, mainly blank spaces within which claims could be written for the purpose of expanding, piecing out and stretching the monopoly to fit and envelope any meritorious competitor. This is certainly an overstraining and over-patronizing of the most liberal doctrines of patent law, which certainly are not to be applied in the case at bar.

What is there left for appellees to rely on? By what unheard of and unknown process of reasoning can the decision of the lower court be sustained?

We have shown that Jones was at least a coinventor and, accordingly, that the Double patent should be declared invalid.

We have clearly shown that the Double underreamer was anticipated by the Jones round-nosed reamer, which was suppressed by Double's notice of infringement; that it was anticipated by the O'Donnell and Willard underreamer; was anticipated by the Brown underreamer; and, in many of its most essential points, was anticipated by such reamers as the Swan, the Canadian underreamer and many others.

We have shown Your Honors that, contrary to counsel's contention, the Double underreamer was merely a transitory step in the art, that it in no wise superseded other prior underreamers, which, as a matter of fact, lasted long after the Double reamer had been abandoned, viz., the Plotts, the Austrian underreamer, the Swan underreamer, and others.

We have also shown conclusively that the Double underreamer covered by patent in suit was abandoned

years ago, and as strong evidence of that fact *we were unable to find a single specimen of that reamer in the entire state which we could offer as an exhibit of a specimen of the underreamer as disclosed by the Double patent in suit!*

We have shown that the underreamers which appellee has been selling almost, if not quite, exclusively since the Wilson underreamer was placed on the market in 1905, are—as Judge Cushman found—infringements of the Wilson underreamer patent and are in no wise entitled to be called Double underreamers, and certainly reflect no credit on the old abandoned Double underreamer covered by the patent in suit.

We have shown that only a very very small percentage of the underreamers manufactured by appellee were Double underreamers covered by patent in suit. So small in number were they that it is absurd to contend that they took the field and that they superseded all others. Clearly Judge Cushman had in mind the *infringing* underreamers of the Double make when giving Double credit for having sold so many underreamers and for having taken the field, and that his reamer was one of decided merit, etc., etc. *The Double underreamer in suit was entitled to no such credit.*

The claims of the Double underreamer patent speak for themselves. Admittedly they are merely combination claims covering questionably new organization of old elements, with certain necessarily definite mode of operation, and as such must be limited to the particular combinations set forth therein.

We have conclusively shown that the Doctrine of Equivalents cannot so extend the scope of the Double

patent as to give it the exaggerated scope appellees claim for it.

We have shown that contrary to appellees' contention, infringement is avoided where an element is divided into two separate parts *if such changes the mode of operation and provides new functions*. In addition to that point, the Wilson prongs have spreading-bearings of an entirely different nature producing a different mode of operation and affording advantages and improvements not found in or realized by the Double construction. Furthermore, in the Wilson reamer there is not a subdivided opposite parallel bearing-faced extension. The lugs 2' are no part of such an extension.

We have clearly shown that the Wilson underreamer is one of novel construction, being superior in strength, superior in expansion and width of cutters and reaming efficiency, superior in endurance and strength, and superior in convenience and safety. In short, that it was the "last step in the art," and that it has superseded all other styles of underreamers *except those which have been declared infringements of the Wilson patent*.

We have also shown that the Wilson underreamer is covered by good and valid patents, and in case No. 2918, now before Your Honors, that practically all the underreamers manufactured by appellee corporation since the year 1905 or 1906 are infringements of the Wilson underreamer patent!

Furthermore, we have shown that the prior art makes it absolutely necessary so to construe the Double patent claims as to limit them strictly to the particular com-

bination of elements recited therein; and that as such they cannot possibly be so extended in scope as to take in the Wilson pronged type of underreamer.

And finally, and what is of very great importance, we have shown that Judge Cushman of the lower court unfortunately based his decision on five (5) palpable errors:

In other words, his decision was based on a combination of errors. Had any one of the errors been omitted, he could, under no circumstances, have found the Double patent infringed.

The combination of errors referred to is as follows:

- First: His error in finding Double to be the sole and original inventor of the Double underreamer in suit, due to his misunderstanding of the testimony quoted from the Mills-Double Interference suit.
- Second: He entirely misunderstood the mechanics of the prior art of which the Jones round nosed underreamer, the Brown underreamer and the O'Donnell & Willard underreamer are probably the most important.
- Third: He erred in that he failed to realize that the Double underreamer in suit was a short step in the art, that it was so highly unsatisfactory that it was soon abandoned; and that later types of the Double underreamers, namely, the infringing types, and which he found "Constituted Combinations of decided merit, entitling complainant's to a fair range of equivalents," were not the Double underreamer of the patent in suit, and conse-

quently the Double reamer of the patent in suit is in no wise entitled to that credit.

Fourth: That he erred in his opinion as to the scope of the Double underreamer patent of narrow and limited combination claims, and the flexibility to which it was entitled by the application of the "*fair range of equivalents.*"

Fifth: He erred in not recognizing the Wilson pronged type of underreamer to be novel and a radical departure from the hollow slotted extension type, or type having an extension interposed between the cutters, such as the Double underreamer, the Swan underreamer, the Jones underreamer, the O'Donnell and Willard underreamer, and the Brown underreamer, etc., etc.

We wish to emphasize the fact that, as Your Honors will observe, the omission of any one of the above five errors would have made it impossible for Judge Cushman to have found the Double underreamer patent infringed.

Finally, we wish to point out that this action was instituted by the appellees as a part of what this record proves to be an attempt to drive the appellant out of the manufacturing of underreamers. In bringing this action the appellees undertook TO PROVE BEYOND A REASONABLE DOUBT that the Wilson underreamer contains the same combination of elements and the same mode of operation as the Double underreamer covered by the claims in patent No. 734,833. THE BURDEN OF PROOF WAS UPON THE APPELLEES to establish their case. We

submit that they have hopelessly failed to do so. The combination that they have alleged to be infringed is not covered by any claim in the Double patent in suit, and we have proven conclusively, that the mode of operation they claim for the Double device, including the "tilting" of the slips during their collapse and expansion, is totally different from the mode of operation found in the Wilson reamer.

We invite the attention of this court to the case which is cited throughout the appellees' brief and upon which appellees rest their case, viz., *Bates v. Coe*, 98 U. S. 31, for we are confident that a study of these underreamers will show that they are substantially different because they perform different duties in a substantially different way, and produce substantially a different result.

We confidently submit that the decree of the lower court should be reversed and the bill dismissed.

Respectfully,

RAYMOND IVES BLAKESLEE,
Solicitor and Counsel for Appellant.

SUPPLEMENT.

DEALING WITH THE MISREPRESENTATIONS, UNTRUTHS AND DISTORTIONS IN APPELLEES' BRIEF.

Repeatedly in the litigation now and previously before Your Honors involving the same general interests represented in this suit, we have found it necessary to point out to Your Honors the glaring departures made by appellees' counsel from the facts and law. Again we find it our duty to put before you further instances of this sort, and reasonable limits of this brief will not permit us to touch upon all these instances. Again and again we find reported authorities not only incorrectly quoted from, but garbled and even reversed in meaning and substance by counsel's tricky procedure. In places counsel includes in his brief as quoted matter what in reality is merely counsel's distorted digest or summary of the substance of the decision. Thus we see that counsel is not only guilty of attempting to make over the patent in suit and its claims, as well as the evidence and testimony in the case in his frantic efforts to support the lower court's findings of infringement, but counsel is likewise guilty of revamping and making over the law as it stands to bolster up and support his unmeritorious case.

We illustrate herewith some of the most flagrant examples of misquoted authorities:

COUNSEL'S VERSION.

THE TRUE VERSION

On page 130 of the brief:

"Infringement cannot be escaped by merely cutting in two a device made in one piece, or by making integral an article formerly made in two."

"Infringement c a n n o t

ordinarily be escaped by merely cutting in two a device made in one piece, or by making integral an article formerly made in two."

Counsel would have it that the rule is inflexible. It is not. There must have been a deliberate omission of the word "ordinarily," for the present case is one in which infringement is escaped by providing two parts for a given purpose, and, therefore, does not fall under the rule, as counsel would make it.

Clearly under the law when provision of two parts in place of one produces different results and permits of performance of new functions the rule asserted by counsel does not apply. That is the situation in the case at bar. That our view is correct is shown by *Nathan et al. v. Howard*, 143 Fed. 889 at page 893, where it is said:

"Neither the joinder of two elements into one integral part accomplishing the purpose of both and no more, nor the separation of one integral part into two, together doing precisely or substantially what was done by the single element, will evade a charge of infringement."

Bundy Mfg. Co. v. Detroit Time Register Co.,
94 Fed. 524, 538, 36 C. C. A. 375;

Dowagiac Mfg. Co. v. Brennen, 127 Fed. 150,
62 C. C. A. 257."

COUNSEL'S VERSION.

On page 132 of brief:

"A specific description of an element in a claim does not operate as a limitation to the form shown unless it is of the essence of the invention, and evasion of the specified form will not escape infringement when the substance of the invention is copied, as a court does not judge about similarities or differences by the names of things, but looks to the machines, or the several devices or elements, in the light of the function they perform."

THE TRUE VERSION.

"All concur in the view that a specific description in the claim of an element in a claim does not operate as a limitation to the form thus shown unless it is of the essence of the invention, and evasion of the specified form will not escape infringement where the substance of the invention is copied; that courts are not to judge about similarities or differences by the names of things, but are to look to the machines, or the several devices or elements, in the light of what they do or what office or function they perform *and how they perform it.*"

In finding equivalence it is important to consider how the function is performed. This part of the citation counsel omitted, hoping thereby to escape the other important feature of the test, namely, how the function is performed.

COUNSEL'S VERSION.

On page 138 of brief:

"It does not follow, from the fact that the claim describes a specific form or construction, that the inventor shall be limited to that form."

On page 130 of brief:

"The placing of stops at the top of the track of a guide for punching presses instead of at the side, and the arrangement of a reciprocating rod to work vertically instead of laterally, does not avoid infringement."

On page 128, what is purported to be quoted from 151 Fed. is not found in the opinion and is merely a reporter's syllabus, and yet counsel quotes it.

On page 124 of brief:

"A combination is a composition of elements, some of which may be old and others new, or all old

THE TRUE VERSION.

"It does not *necessarily* follow, from the fact that the claim describes a specific form of construction, that the inventor shall be limited to that form."

"The difference between the respondents' machines and Conley's device is solely in form. In substance they are the same. The respondents, instead of placing their stops at the side of the track, as Conley showed in his specification, placed them above or on top of the track and their reciprocating rod works vertically instead of laterally."

"A combination is a union of elements, which may be partly old and partly new, or wholly old

or all new. It is, however, *the combination* that is the invention and is as much a unit in contemplation of law as a single or non-composite instrument. Whoever uses it without permission is an infringer of it. Whoever contributes to such use is an infringer of it."

or wholly new. It is, however, *the combination* that is the invention, and is as much a unit in contemplation of law as a single or noncomposite instrument. Whoever uses it without permission is an infringer of it. Whoever contributes to such use is an infringer of it."

The most flagrant instance of law-twisting by counsel appears at the bottom of page 122. It will be seen that counsel chops the terminal sentence in two, robbing it of its true meaning, which is the opposite of that appearing by the purported quotation, and directly against counsel's contentions.

COUNSEL'S VERSION.

On page 122 of brief:

"The object of the law authorizing the grant is to stimulate invention by this reward to the inventor. It must be administered in conformity with this liberal policy, as a wise exception from the common law against monopolies. *So the exclusive privilege of the patentee must be protected to the full extent*

THE TRUE VERSION.

"The object of the law authorizing the grant is to stimulate invention by this reward to the inventor. It must be administered in conformity with this liberal policy, as a wise exception from the common-law rule against monopolies. So the exclusive privilege of the patentee must be protected to the full extent of his inven-

of his invention and grant." tion and grant, while its limitations are to be strictly observed to prevent interference beyond the fair scope of valid grant with improved means or other inventions, the promotion of which is the constant view of the patent policy."

The quotation from 171 Fed., on page 123 of the brief, is likewise a syllabus and not in the opinion. The same may be said of the following quotation.

Counsel wilfully distorts the opinion in 56 U. S., quoted from on page 196 of appellees' brief, leaving out the terminal portion of the sentence which is damning to counsel's case, in view of the limitations of the patent in suit. Comparison will show this.

COUNSEL'S VERSION.

On page 196 of brief:
"And, therefore, the patentee having described his invention and shown its principles and claimed it in that form which most perfectly embodies it, is in contemplation of law deemed to claim every form in which his invention may be copied. * * *"

THE TRUE VERSION.

"And, therefore, the patentee, having described his invention and shown its principles and claimed it in that form which most perfectly embodies it, is in contemplation of law deemed to claim every form in which his invention may be copied, unless he manifests an intention to disclaim some of these forms."

If Your Honors will refer to the authorities further instances of garbling and mis-stating of the same will be found at the following places in appellees' brief. In places also counsel quotes matter which is not found in the respective opinions at all:

The quotation from 89 Fed., at page 13;

The quotation from 164 Fed., at page 38;

The quotation from 13 C. C. A., at page 40, is not found in the opinion at all;

See also the quotation on page 43 from 142 Fed.;

Likewise, quotation from 151 U. S., same page;

The quotation from 18 Wall., on page 30;

The quotation from 127 Fed. 161., same being a syllabus and not part of the opinion;

The purported quotation 215 Fed., commencing at page 70, which seems to have sentences arbitrarily incorporated by counsel;

The purported quotation from 204 Fed., on page 72;

The quotation from 219 Fed., on page 73;

The quotation from 124 Fed., on page 83;

That from 143 U. S., on page 85 of the brief, cannot be found in the opinion;

The purported quotation from 98 U. S., commencing on page 96 of the brief, is run together as continuous when in fact it consists of separated fragments;

The same performance is found in quoting from 152 Fed. (132), at the bottom of page 120 of the brief;

See also purported quotation from 179 Fed., page 121 of brief, and from 19 Wall., page 122 of brief;

Counsel's rendition of the opinion in his quotation on page 123 of the brief, 142 Fed., is purely arbitrary editing of the opinion;

Counsel omits part of the sentence quoted from in 166 Fed., on page 124 of brief;

Again we find the court's opinion arbitrarily edited by counsel, on page 127 of brief, in quoting from 143 Fed.;

We find the same performance in quoting from 115 Fed., on page 131 of the brief;

Also quoting from 120 Fed., at page 132 of brief, we find the same editing performance;

We fail to find the matter quoted from 180 U. S., at page 153 of brief;

A syllabus is set forth as a quotation from the opinion in 152 Fed., on page 189 of brief;

Counsel likewise quotes from opinions matter therein quoted from prior cases, as if same appeared in the opinions themselves, and performs other sleight-of-hand tricks, such as italicizing where no italics appear, which may be the least of his questionable doings in the category under consideration.

We will now deal briefly with certain other unconscionable and fallacious fragments of appellees' brief, of a different kind.

We quote from page 68 of appellees' brief as follows:

"Both Mr. Jones and his partner, Mr. Skinner, admit that in October, 1902, they received a notice from Mr. Double and the Union Tool Company that such reamer [the Jones removable bowl reamer] was claimed to be an infringement upon Mr. Double's inventions, and notifying Jones and Skinner to stop the manufacture."

Mr. Skinner makes no allusion whatever in his testimony to this notice.

This notice referred to the Jones round-nosed reamer, and not to the removable bowl reamer, as the testimony clearly shows on T. of R. pp. 903 and 907.

We quote again from appellees' brief, on page 70, as follows:

"The testimony of Frederick W. Jones that he had anything whatever to do either with the invention of the Double reamer, or even with the manufacture of the first Double reamer, is in fact *without any corroboration whatever.*"

As to this statement of counsel, we simply refer Your Honors to the testimony of Richardson, Naugle and Mrs. Jones. Also Skinner's testimony, taken with that of Haskett and Shaw, supports Jones' testimony, instead of impeaching it, as stated later on, on this page of appellees' brief.

Appellees' brief states, page 81, as follows:

"Mr. Jones does not testify that he had anything whatever to do with either the inventing of the second Double reamer, made in 1901,—the one like the patent in suit."

The testimony of Jones speaks for itself and shows this to be untrue.

Speaking of this Jones round-nosed reamer, on page 83 of appellees' brief, counsel states:

"There is no proof that Mr. Jones ever sold one of the 'round nose' reamers. The only proof is that he contrived it, made a wooden model of it, and abandoned it in favor of another construction which he thought would be operative and better."

To refute this false statement, see testimony of Jones, T. of R. p. 897, as follows:

“We made several reamers of the type disclosed by the wooden model” (Jones round-nosed reamer) “and sold them.—That was in 1901 and '2.”

There is in evidence a working underreamer of this type, which makes absurd counsel's statement that merely a wooden model was made.

Appellees' brief says on page 147:

“Mr. Elihu C. Wilson testifies that he had the Double reamer before him when he produced the first Wilson reamer. That he was seeking to improve the Double reamer.”

There is no such testimony.

The testimony of Mr. Wilson is that he was seeking to devise a radically new reamer which would overcome all of the serious defects of all other reamers then known, including the Double.

To emphasize the falsity of this statement of counsel and to show how differently Wilson proceeded in devising his radical invention, see testimony of Elihu C. Wilson, R. I. 140, *et seq.*

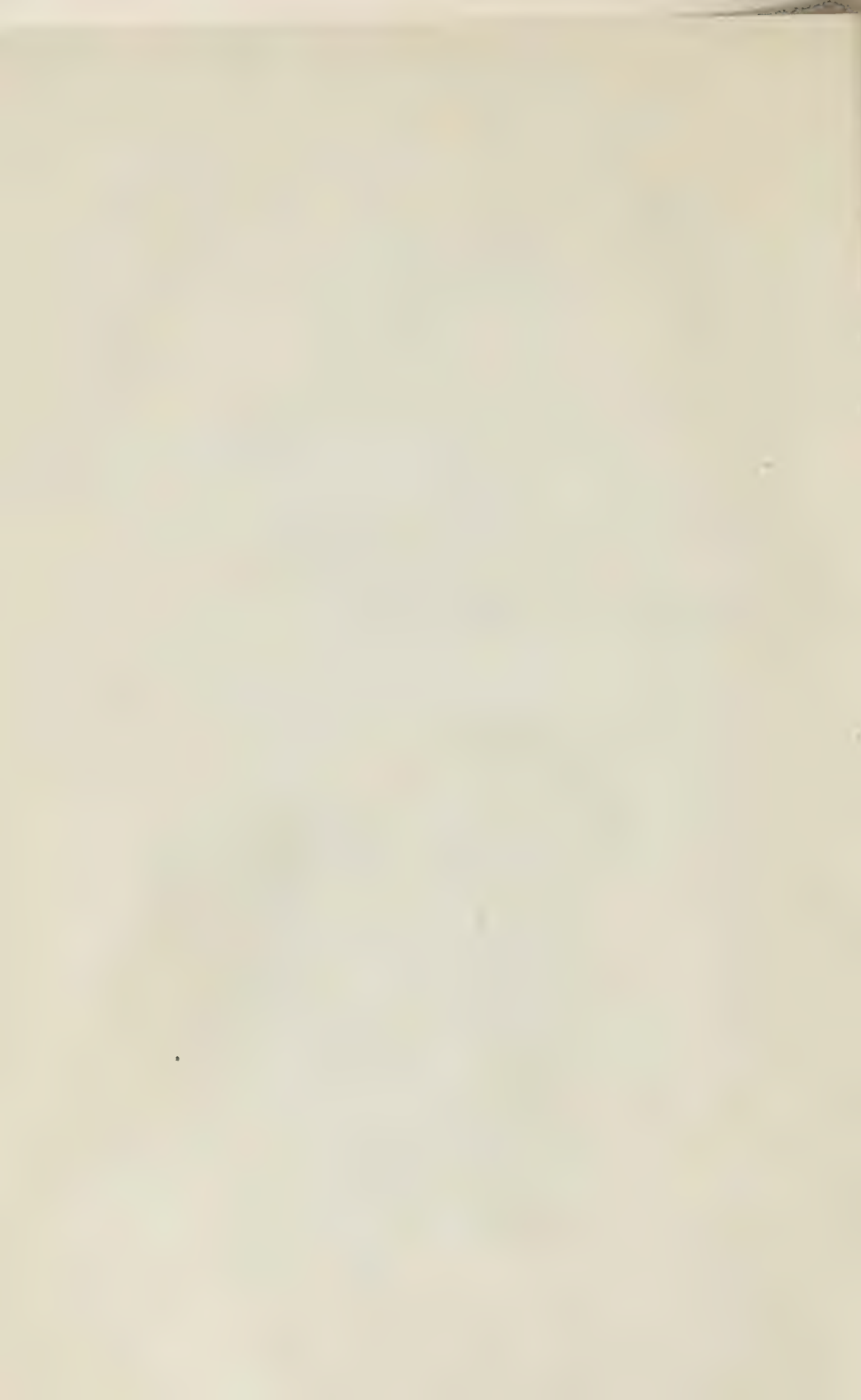
We insert here illustrations and explanations by cut, which make absurd counsel's attempts to support Judge Cushman's erroneous finding that the shoulders or cutter-ways of the Wilson reamer body afford inner, outer and lateral bearings for the cutters, in the same manner that the dovetailed slip-ways of the patented Double reamer afford such three kinds of bearings.



Section view of Double Under-Reamer showing interlocking dovetails of body and cutters providing inner, outer and lateral bearing for the Cutter.



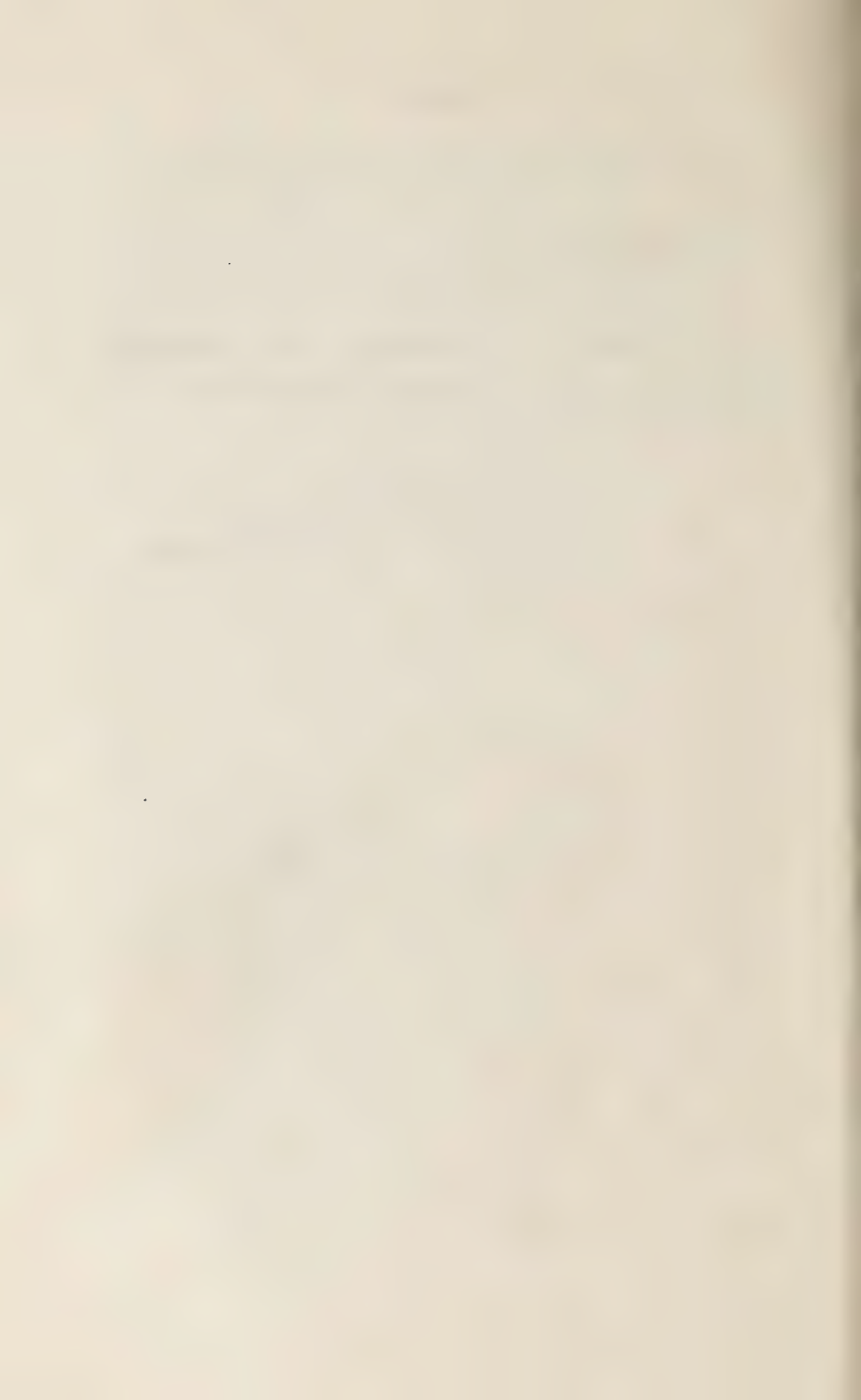
Section view of Wilson Under-Reamer showing shouldered Cutter ways providing outer, lateral but no inner bearing. Cutters are not interlocked hence no dovetails.



It is pitiable to note that counsel, on page 162 of appellees' brief, tries to make it appear that Judge Cushman referred to the upthrust bearings 8 of the Double patent, rather than to the inthrust bearings 6, when referring to the inner bearings for the cutters resulting from the interrelation of the dovetails. Clearly, these upthrust bearings 8 have nothing to do with the interrelated dovetails.

Respectfully,

RAYMOND IVES BLAKESLEE,
Solicitor and Counsel for Appellant.



No. 2996.

United States
Circuit Court of Appeals,
FOR THE NINTH CIRCUIT.

Wilson & Willard Manufacturing Co.,

Appellant,

vs.

Union Tool Company, et al.,

Appellees.

PETITION FOR REHEARING.

FREDERICK S. LYON,

Solicitor for Appellee.

FILED

APR 15 1905

522



No. 2996.

United States

Circuit Court of Appeals,

FOR THE NINTH CIRCUIT.

Wilson & Willard Manufacturing Co.,	}
<i>Appellant,</i>	
<i>vs.</i>	
Union Tool Company, et al.,	
<i>Appellees.</i>	}

PETITION FOR REHEARING.

The complainants and appellees feeling themselves aggrieved by the decision herein rendered by this Honorable Court on February 11th, 1918. come now and respectfully petition the court for a rehearing of this cause upon the grounds hereinafter stated.

I.

**Misconception by the Court of the Facts in Connec-
tion With the Prosecution of the Application for
the Patent in Suit.**

In the court's opinion, on page 11, the court says:

“The importance of this point is emphasized by the record which shows that Double cancelled his

claim No. 8 and substituted claim No. 7, limited his specification and amended his claims to provide for opposite parallel bearing faces upon his hollow slotted extension.”

The claim 8 referred to by the court as cancelled apparently is claim 8 of the amendment of September 13th, 1902, and appears on page 245 of the “Book of Exhibits” as follows:

“In an underreamer the combination of a hollow mandrel, a slip-carrying rod in said mandrel, slips connected to said rod, and means for tilting said slips.”

This claim 8 was rejected on the patent to Brown, 687,296. At the same time claim 8 of the patent (10 of said amendment) had been allowed. No amendment was made to the specification to secure the allowance of such claim 8 of the patent at the time of cancelling the original claim 8, and there was made no limitation of the specification to secure such allowance which can be referred to the cancellation of such cancelled claim 8. Analysis of such cancelled claim 8 shows that it calls solely for the following elements:

1. A hollow mandrel;
2. A slip-carrying rod in said mandrel;
3. Slips connected to said rod; and
4. Means for tilting said slips.

It is seen in this connection that this claim does not even call for a structure wherein the so-called slips or cutters project from the bottom of the mandrel. No reference whatever is made to the mandrel or body being provided with open slipways, nor are the slips or

cutters called for as having shanks extending into such open slipways. Furthermore, as set forth, this cancelled claim 8 does not call for the expanding surfaces on the slips such as used by both the Double and the Wilson reamers, and such, for example, as set forth in claim 6 of the patent in suit, original claim 7 of the application as filed.

The cancellation of this claim 8 estops appellees from claiming the same breadth of scope for subsequently allowed claims as would be given to this cancelled claim. But when the open slipway construction is brought into the claims, as in claim 1, for example, it does not require or estop the court from giving effect to a claim for such open slipway construction and require the court to limit such claim to each and every exact detail of construction not essential to an open slipway construction. *The record shows that the Double invention was the first to utilize tilting slips having shanks extending into open slipways in combination with a body provided with open slipways therefor.* The Double invention was not limited to the initial release referred to by the court.

A very careful reading of the opinion of this court seems to disclose that the court has misunderstood the facts. On page 9 of the opinion the court says:

“The record shows that this operation causes what is called ‘plunging’ and which is obviated in the Wilson underreamer because of the fact that the cutters there collapse on the beginning of the downward movement.”

The "operation" so referred to by the court is the initial release or collapse of the cutters *when the underreamer is to be withdrawn from the well*. It is submitted that the court has pointed out a possible improvement of the Wilson underreamer upon the Double invention and it is also submitted that this does not deny that the substantial principle and interrelation of parts of the Double invention has also been used in the Wilson reamer. None of the claims in suit in any manner call for such an interrelation of the parts *as would limit them to the initial expansion feature thus referred to by the court*.

It is furthermore submitted that the paragraph of the court's opinion commencing at the bottom of page 8 is in error. The feature of the Double invention of providing for the contact of the casing-shoe with the upper end portions of the shanks of the cutters close to the pivot point of the cutters on the spring-actuated rod is included in claim 1 most clearly and certainly and in the following language: "And upwardly and inwardly sloping dovetail slipways beneath said shoulders," the same being called for in combination with "dovetail tilt-slips playing in the slipways." This is not for *"the sudden collapse of the cutters,"* but, *on the contrary, is to so interrelate the leverage exercised by the end of the pipe of the casing-shoe on the shanks of the cutters to the pivot point of the cutters on the spring-actuated rod so as to secure the maximum amount of inward movement of the lower or cutting ends of the cutters by the maximum amount of the inward movement of the upper ends of the cutter*

shanks caused by the pressure of the casing-shoe. It is this feature that was new in the Double invention and was one of the novel interrelations produced by Mr. Double. The question of quick collapse was not involved; on the contrary, it was a question of a sufficient movement of the cutting ends of the bits or cutters to bring them inward a sufficient distance to permit their withdrawal into the well pipe or casing, and to hold them in such position that the outer edges thereof would not contact into the inner surface of such casing or pipe wells while the reamer was being lowered through the casing.

In the prior are there was no underreamer which had the *open slipways* so that this contact of the casing-shoe could be close to the pivot point. Whether the Wilson initial collapse be an improvement upon the Double initial collapse or release is not material to this feature, and such initial collapse is in no manner an imitation expressed in any of the claims of the Double patent. On the contrary, the claims are broadly expressed so as to avoid any limitation to questions of initial collapse.

The attention of the court is further directed to the fact that instead of the Double claims or specifications referring in any manner to such initial collapse, both the specification and claims are entirely silent with respect thereto. It is logically impossible, therefore, to hold that the Double patent, by its specification or claims, *shows any intent on behalf of Mr. Double to limit either his invention or his claims* to such initial collapse and there is nothing in the proceedings in the

patent office which shows any such intention. Nor is there anything in the prior art which requires or required such limitation. This court says in its opinion, page 10:

“The Double underreamer should have been held to have been a step in the art, carried forward by Wilson’s invention.”

The court here recognizes and adopts appellees’ position, but has apparently misunderstood a number of the contentions raised by the appellant and their application to the controlling facts in the case. The question of difference in initial collapse or release of the cutters was not the novel feature of the Double invention, and apparently the court has fallen into further misapprehension as to the mechanics of the case, for in the opinion, page 8, it says:

“The tilting action of the cutters of the Double device, due to the presence of the spreading member or downward extension between the cutters at the time of collapsion, is not to be had in the Wilson reamer, for, as already indicated, there is no part of the mandrel between the cutters at the time of collapsion upon which there could be a tilting.”

The tilting action of the Double cutters and the tilting action of the Wilson cutters *is shown to be the same* by referring to the Wilson patent Fig. 1, Book of Exhibits, page 278. Notice the position of the shanks of the cutters as shown in dotted lines. The upper ends of these cutters have moved away from the vertical portion of the rod 5'. At this time the parts are shown

in their extreme collapsed positions. The same is true in the extreme collapsed positions of the Double bits and cutters when the shoulders 18 of the Double cutters have slid off below the end of the reamer body. (See Fig. III of Double patent, Book of Exhibits, page 258.) In both the Double reamer and in the Wilson reamer the tilting action of the cutters is substantially identical,—if not absolutely identical. In neither is this tilting action in any manner due to the presence of any spreading member or downward extension between the cutters at the time of collapsion. On the contrary, in the specific or preferred embodiment of the Double invention set forth in the Double patent, the cutters are cut away at 26, above the shoulders 18, so that this collapsing is permitted without the cutters in any manner touching the spreading member or downward extension, *in the same manner as in the Wilson device*. There is, therefore, no part of the body of the reamer which takes part in this collapsing action. If the court, in the extract just quoted from its opinion, by the word “mandrel” referred to the body of the reamer, the foregoing observation shows the error in mechanical fact. If, however, the term mandrel was used to identify the spring-actuated rod 5' of the Wilson reamer, it is manifestly in error as the head of such rod is, of course, between the cutters at the time of collapsion and it is upon this head that such cutters tilt. This brings us to a consideration of the amendment made to the Double specification referred to by the court in its opinion. This amendment was by the insertion of the matter appearing in lines 75-87 of the

Double specification, Book of Exhibits, page 260. (See amendment B, last paragraph on page 249 of the Book of Exhibits.)

The key-seats or sockets 18 in the shanks of the Wilson bits are clearly "*somewhat larger*" than the key or head 5 of the rod 5'. (See Book of Exhibits, pages 278, 279.) If this were not so the positions illustrated in dotted lines in figure 1 would be impossible. The further explanation thus given of the Double invention by this insertion to the Double specification is fully found in the Wilson device. This amendment, therefore, cannot form a limitation which will permit the Double underreamer, a step carried forward by Wilson's invention, to escape infringement of the Double patent.

This court, on page 6 of its opinion, apparently misconceives the mechanical facts in relation to the action of the tilting collapse of the Wilson cutters. The court says (about the middle of the page): "*The shoulders * * * do not permit a sliding action of the shanks of the cutters upon the suspension means to permit tilting.*" This is shown to be error by reference to Fig. 1 of the drawings of the Wilson patent. It will be demonstrated to be error by reference to a Wilson reamer, but extreme care must be taken as the true action of the Wilson cutters on the head of the rod 5' cannot be seen unless the spring-actuated rod is in position and exerting its tension.

The only other amendment to the Double specification was to insert the descriptive words "with oppositely arranged parallel bearing facts." (Lines 50, 51, page 1 of the Double patent, Book of Exhibits, page 260.)

More readily ascertained by the insertion shown on page 232 of the Book of Exhibits, and the minor changes also shown in the small print on pages 232, 233 and 326 of the Book of Exhibits. These were all immaterial. The only addition to the specification or change in it that can be claimed as a limitation is the insertion which has just been quoted, and it is a true description of the intrust bearings which are formed at the lower end of the outward extensions. These intrust bearings are "oppositely arranged parallel bearing faces." They could not in a description be described as anything else and be accurately described, but they do not show an intention to limit the patent to such preferred form of construction. Furthermore, these oppositely arranged parallel bearing faces are the intrust bearings only and correspond as intrust bearings with the intrust bearings 9 on the prongs of the Wilson underreamer. (See Book of Exhibits, page 278.)

It is only by reading into the Double claims features of construction shown in the Double patent drawings, which are not set forth in the claims, that the Wilson reamer can be differentiated from the preferred embodiment of the Double invention by means of the initial collapse and by reason of the difference between straight parallel bearing faces and their relation to upwardly inclined dove-tailed ways and slightly tapered oppositely arranged bearing faces 9 of Wilson's patent, and the straight dove-tailed ways. So far as the broad Double invention is considered, i. e., being the first to utilize the open slipway construction of the body and

the cutters with shanks extending into the slipways, shanks and slipways being dove-tailed, and the end portion of the reamer provided with oppositely arranged bearing faces on which the cutters bear, the two devices are substantially the same.

It is not intended in this petition to point out every apparent mechanical error in the opinion filed, nor is it the purpose or intent hereof to criticize such opinion, but it seems therefrom that appellants have not succeeded in clearly bringing before the court the true mechanical facts and that the court has misunderstood the same. As further evidence thereof attention is called to page 7 of the court's opinion in which it is

“In the Wilson cutters there are not inward projections which slide upon the downward extensions of the mandrel, nor are there the upper faces of the inward projections sloping downwards. In fact, the Double cutter does not contain shanks; whereas, the Wilson cutter has a cutter-head and a long shank.”

In the first part of the matter just quoted the court has apparently compared the Wilson cutters with the Double cutters and refers to the shoulder 18 of the Double patent, which shoulder causes the expansion when the upper surfaces of such shoulder contacts with the inclined or rounded end of the body. Referring again, for convenience, to the Book of Exhibits, pages 278 and 279, and to the Wilson patent, the shoulders 16 are rounded for the purpose of contacting with the inclined lower end surfaces 17 of the body and the surfaces 4^s *extend inward. That is face in-*

ward, for the same purpose as does the surfaces 18 of the Double bit, the surfaces 4³ and 18, respectively, being the intrust bearings of the cutters. Not only are these facts true, but it will be noted from the drawings of the Wilson patent that these surfaces 4³ slope downwardly and correspond in such slope to the slope of the surface 18 of the Double patent. (Book of Exhibits, page 259, Fig. XII.)

In the last quotation from the court's opinion, the statement that the "Double cutter does not contain shanks" is shown to be a mechanical error by reference to the drawings of the Double patent or to any of the Double reamers. In fact it is claimed that the notch 26 in the shanks of the Double cutters was the weakness of the cutters.

It is believed that the foregoing illustrate the necessity of a reargument and rehearing of this case in order to do substantial justice. It is believed that the court has been permitted to form an erroneous impression of the mechanics of the case, and for each of these reasons a rehearing is requested.

FREDERICK S. LYON,

Solicitor for Appellee.

No. 2996.

United States
Circuit Court of Appeals,
FOR THE NINTH CIRCUIT.

Wilson and Willard Manufacturing
Co.,

Appellant,

vs.

Union Tool Company, et al.,

Appellees.

Appellant's Reply to Appellees' Petition for Rehearing.

RAYMOND IVES BLAKESLEE,

Solicitor for Appellant.

No. 2996.

United States
Circuit Court of Appeals,
FOR THE NINTH CIRCUIT.

Wilson and Willard Manufacturing
Co.,

Appellant,

vs.

Union Tool Company, et al.,

Appellees.

Appellant's Reply to Appellees' Petition for Rehearing.

In his petition the plaintiff-appellee does not agree with the opinion of this court that:

"The importance of this point is emphasized by the record which shows that Double cancelled his claim No. 8 and substituted claim No. 7, limited his specification and amended his claims to provide for opposite parallel bearing faces upon his hollow slotted extension."

We entertain no doubt that this court understands the elements of the Double device so thoroughly that no attempt to confuse these details will persuade it to

alter the sound opinion it has above expressed. A study of the file wrapper and contents of the Double patent on pages 227 to 264 of the book of exhibits in this case will show very clearly what was abandoned and what was sought to be claimed. The plaintiffs-appellees are plainly limited to the use of the opposite parallel bearing faces on their downward extension, and the exhibits referred to plainly show the effort the petitioner has made to cover these elements of his combination by the claims in his patent.

The object of this contention is to attempt to give his claims as broad a scope as his rejected claim 8 would have had. He is attempting to evade the limitation in his specifications and claims which prevents his opposite, parallel bearing faces from covering bearing faces which are not parallel. The opposite parallel bearing faces render impossible the gradual collapse of the slips which is necessary in order to avoid the evil known as "plunging" when the underreamer is used in hard ground, and this evil was eliminated by the use of the Wilson inclined bearing faces.

As much imagination would be required in order to believe that Wilson's inclined bearing faces were the equivalent of the opposite parallel bearing faces of Double as would be required to believe the argument on pages 12 and 13 of the petition which is intended to show that the faces 16 and 4^o of the Wilson cutters are the equivalents of the face 18 on the Double slips.

The next argument is intended to prove that the Double invention has the same mode of operation in its initial collapse as has the Wilson underreamer, and the opinion of the court is quoted as follows:

“The record shows that this operation causes what is called ‘plunging’ and which is obviated in the Wilson underreamer because of the fact that the cutters there collapse from the beginning of the downward movement.”

The plaintiff-appellee then attempts to deceive this court into believing that the “operation” referred to is the initial release or collapse of the slips *when the underreamer is to be withdrawn from the well*. This is not true. The “plunging” occurs during underreaming and not when the underreamer is being withdrawn from the well, and the evil of “plunging” is due to the slips resting on opposite, parallel bearing faces in the Double device. *Wilson eliminated this evil by so forming and adapting his lug element that the collapse of the cutters would begin with the first downward movement of the cutters*. With the Double no collapse can take place during the downward movement of the slips until said slips have moved the length of the opposite, parallel bearing faces. These parallel bearing faces produce the evil of “*plunging*” *while underreaming* and can never be used with a successful underreamer. They are positively a part of the Double combination and are included in his claims in the patent at bar. This court has rightly held that the Wilson lugs with inclined faces are not the equivalent of these opposite, parallel bearing faces on the Double downward extension, and this must be apparent when it is admitted that this Wilson feature eliminated this evil of “plunging” because the use of the Wilson lug with its inclined bearing face *gave the Wilson underreamer*

an entirely different mode of operation from that of the Double device. No argument will escape this fact.

The plaintiff-appellee has made a great effort to disguise this feature by arguments including open slipways, the tilting of the cutters, and the contracting of the cutters with the casing shoe, in an attempt to prove that Double is not limited in his claims to this method of the initial collapse of his cutters. This is only his manner of disguising a feature he greatly fears. Double's method of initiating the collapse of his slips is due to and depends entirely upon the use of opposite, parallel bearing faces, and as these are specifically claimed for this purpose in his claims he is limited to this mode of operation, which Wilson does not use. In this connection we will only say further that the importance of these opposite, parallel bearing faces to the Double invention is pointed out on pages 10 and 11 of petitioner's argument, as follows:

"The only other amendment to the Double specification was to insert the descriptive words 'with oppositely arranged parallel bearing facts' (faces). * * * The only addition to the specification or change in it *that can be claimed as a limitation* is the insertion which has just been quoted, and it is a true description of the intrust bearings which are formed at the lower end of the outward extensions. These intrust bearings are 'oppositely arranged parallel bearing faces.'"

(Like most of the citations and quotations in any brief of opposing counsel, the above quotation is in error, using the word "facts" where "faces" is used in the original text. In this instance we do not believe that the misquotation is intentional.)

The petitioner has again reverted to his favorite argument in regard to the so-called tilting of the Double slips when they collapse. The court correctly held that this tilting of the Double slips was due to the fact that the portion of the mandrel which acts to spread the slips apart when reaming, acts as a fulcrum for this tilting motion when the slips collapse. Also it was held that the Wilson cutters could not tilt in this manner as there is no portion of the spreading member between them during collapse to act as a fulcrum for this movement

The plaintiffs-appellees say (page 9 of petition):

"In both the Double reamer and in the Wilson reamer the tilting action of the cutters is substantially identical,—if not absolutely identical. In neither is this tilting action in any manner due to the presence of any spreading member or downward extension between the cutters at the time of collapsion."

Mr. Double, the purported inventor of this device, does not agree with the petitioner, as will be seen from his testimony on page 963 of the record:

"My reamer had a tilting action, the cutters tilt on the key so as to allow the cutters to *close around the end of the underreamer so as to collapse.*"

We feel that the able decision of this court clearly shows that it has studied and fully understands the modes of operation of these devices and cannot be made to believe that the Wilson underreamer has a mode of operation even similar to that of the Double device. No argument will conceal the fact that the spreading member on the mandrel of the Wilson device is between the cutters when reaming and not between them when

collapsed; while the spreading member in the Double combination is between the slips at all times, and serves as a fulcrum for the expansion and collapsion of the slips. We are not afraid that the plaintiffs-appellees will be able to deceive this court with regard to these facts.

The plaintiffs-appellees charge this court with having failed to understand the Double device when it declared that the Double slips do not contain shanks, whereas, the Wilson cutters have cutter-heads and long shanks, but his only attempt to substantiate his statement is to say that this conclusion of the court "is shown to be a mechanical error by reference to the drawings of the Double patent or to any of the Double reamers."

Now this court will realize that most of the exhibits in this case are of Double infringements of the Wilson device and these infringements contain the Wilson cutter with cutter-head and a long shank. However, reference to the drawings of the Double patent in suit (Figs. X, XI and XII of patent book of exhibits, page 259) will show that in this device the cutter was not a cutter but a "slip" in the sense that it was without a shank as in the Swan underreamer, and was just as wide at the top as at the bottom, or cutting edge. The original Double reamer, which is the subject of this litigation, could not use a cutter with a shank and broad cutter-head because its mandrel did not have the Wilson lugs. As soon as the Wilson device appeared on the market the original Double reamer became instantly obsolete and Double sheared away its side-webs to form lugs, which permitted of the use of a cutter (as distinguished from a slip) with shanks and a broad

cutter-head. These are features of the Wilson invention and this court has correctly held them to be infringements of the Wilson patent.

We apprehend that this court will not wish us to argue any of the plaintiffs'-appellees' points at any length. The case has been carefully studied by Your Honors, as is evidenced by the detailed opinion you have rendered. We are confident that that opinion shows a knowledge of the details of these devices which cannot be confused by the statements of opposing counsel denying that certain most obvious results and forms of construction in these devices are what any honest person must concede them to be.

The reargument and rehearing of this case is asked for on the ground that this court has an erroneous impression of the mechanics of the devices in suit. No doubt this would give the opposing counsel another opportunity to attempt to confuse the court regarding these devices, but we have no fear in leaving this decision to this court as we are perfectly certain that anyone will be convinced that Your Honors' opinion in this case shows conclusively that you have thoroughly understood the underreamers in suit. All of the issues in this case have been thoroughly tried and this petition for a rehearing is, itself, the strongest argument that the plaintiffs-appellees in this case are unable to show any errors on the part of this court, and that their petition should, therefore, be dismissed.

Respectfully submitted,

RAYMOND IVES BLAKESLEE,

Solicitor for Appellant.

